

# Service Manual

## and Technical Guide

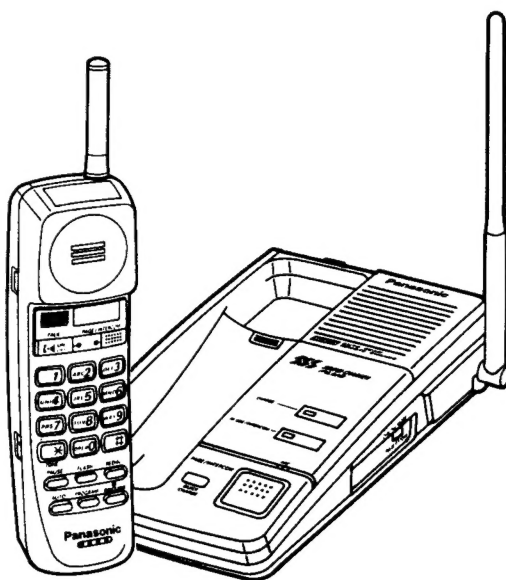
CORDLESSPHONE

Telephone Equipment



# KX-T3950

(for U.S.A.)



(Model KX-T3950R)

(Model KX-T3950H)

### ■ SPECIFICATIONS

#### General

Modulation:	FM, 5 kHz Deviation
Frequency Stability:	±2.5 kHz
Dial Type:	Tone (DTMF)/Pulse
Redial:	Last dialed number each time the Redial button is pressed
Pause:	3.5 seconds per pause

	Base unit (KX-T3950H)	Portable handset (KX-T3950R)
Power Source:	AC adaptor KX-A11-5 (DC 12 V)	Built-in rechargeable Ni-Cd battery (KX-A36A)
(Receiver Section)		
Receiving frequency:	10 channel within 49.6 to 49.9 MHz	10 channel within 46.6 to 46.9 MHz
Adjacent Channel Rejection:	40 dB	40 dB
Sensitivity:	1 $\mu$ V for 20 dB S/N	2 $\mu$ V for 20 dB S/N
(Transmitter Section)		
Transmitting Frequency:	10 channel within 46.6 to 46.9 MHz	10 channel within 49.6 to 49.9 MHz
Jacks:	DC IN, Telephone Line	
Antenna:	Rubber Flexible	Rubber Flexible
Speaker:	2" (5 cm) PM Dynamic	1 3/16" (3 cm) ceramic type
Microphone:	Condenser Microphone	Condenser Microphone
Dimensions (H×W×D):	2 1/32"×5 5/8"×9 1/16" (60×143×230 mm)	10"×2 3/16"×2" (254×56×51 mm)
Weight:	1.1 lbs. (497 g)	0.53 lbs. (242 g) with battery

Design and specifications are subject to change without notice.

# Panasonic

When you mention the serial number, write down the 11 digits. The serial number may be found on the label affixed to the bottom of the unit.

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## LOCATION OF CONTROLS

### Base Unit (KX-T3950H)

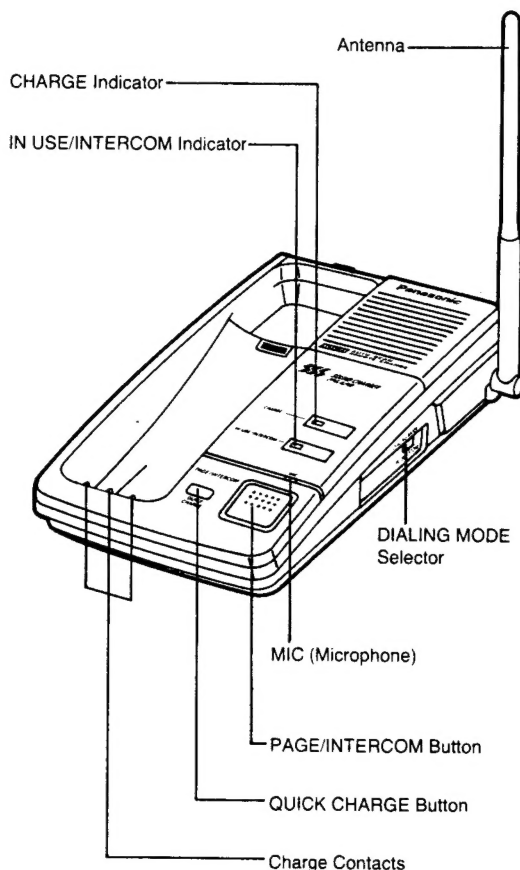
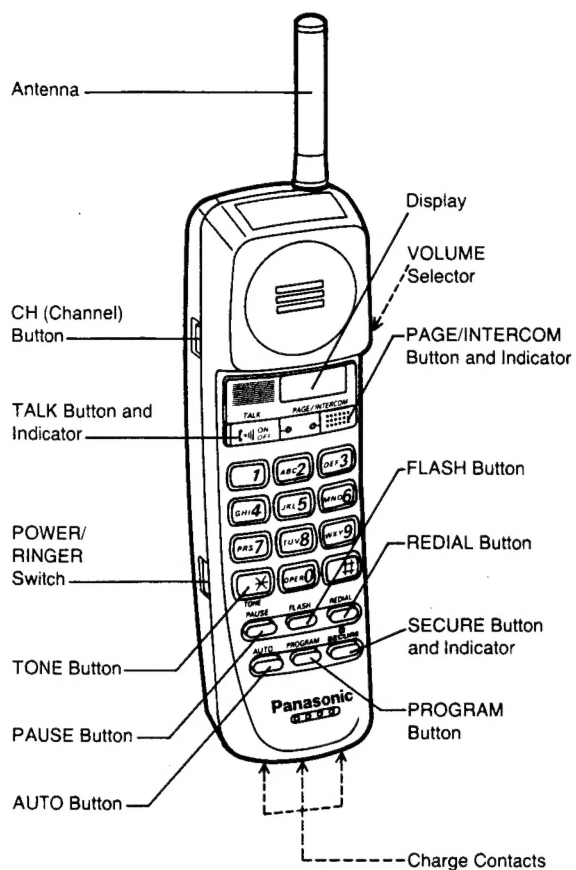


Fig. 1



## Portable Handset (KX-T3950R)



### Display



(This display shows all the possible configurations.)

**OUT RANGE** You pressed the TALK button or the PAGE/INTERCOM button under some bad condition.

**PROG** The unit is in programming mode.

+ [Battery Icon] The battery is fully charged.

+ [Battery Icon] The battery strength is medium.

+ [Battery Icon] The battery strength is low.

+ [Battery Icon] (flashing) The battery needs to be charged.

CH 2 The channel number is displayed during a conversation. (Example: channel 2)

Fig. 2

## BATTERY REPLACEMENT

### Standard battery life

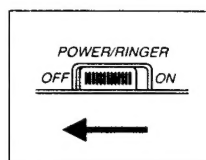
If your Panasonic battery is fully charged:

In TALK mode	Up to about 8 hours
In Stand-by mode	Up to 21 days

Battery life may vary depending on usage conditions and ambient temperature. If you are using "secure call" feature, the battery life in TALK mode might be up to 7 hours.

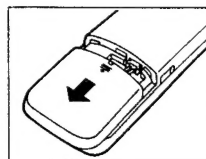
Replace the battery with a new one if "+ [Battery Icon]" flashes after a few telephone calls even when the battery has been charged for 10 hours.

1



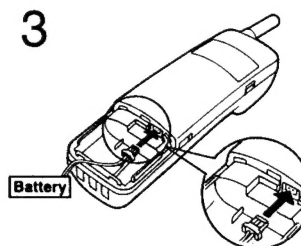
Set the POWER/RINGER switch on the portable handset to the OFF position, to prevent the memory loss.

2



Remove the battery compartment cover.

3



Replace the battery.

— When you finish, close the cover and set the POWER/RINGER switch to the ON position.  
— Complete the replacement within 5 minutes, or memory may be lost.

Fig. 3

# DISASSEMBLY INSTRUCTIONS

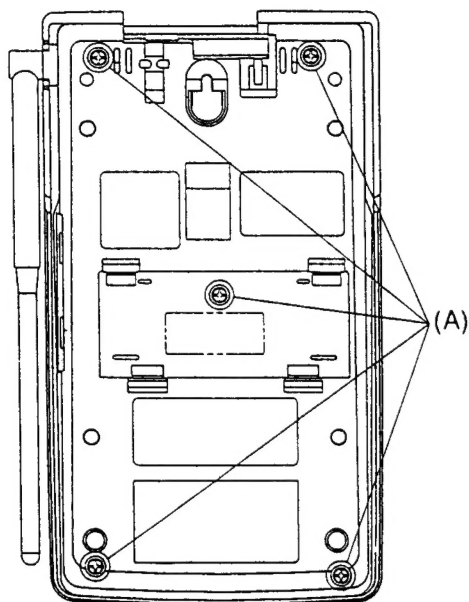


Fig. 4

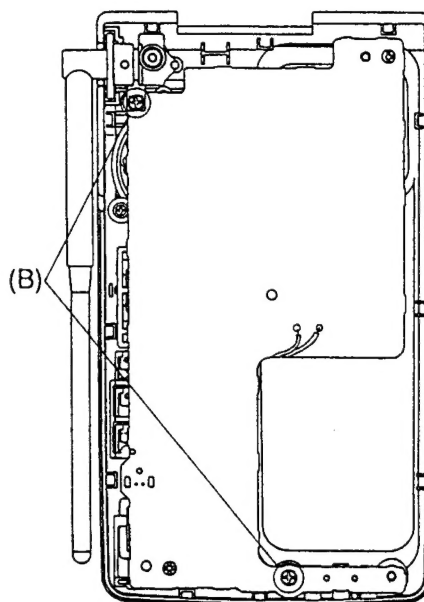


Fig. 5

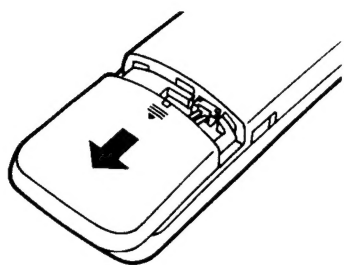


Fig. 6

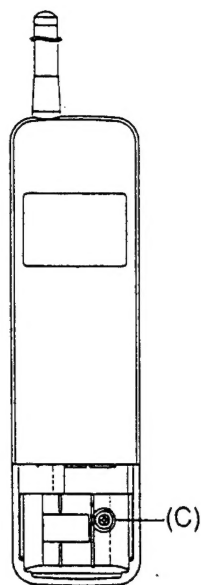


Fig. 7

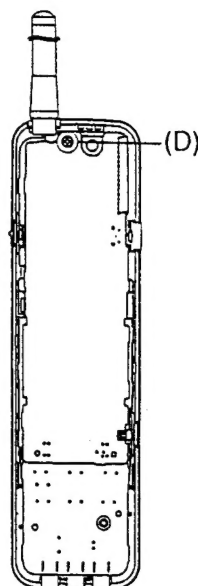


Fig. 8

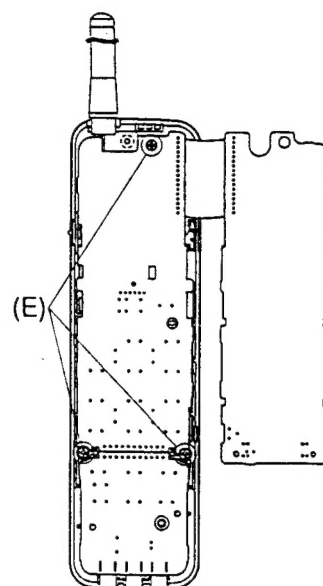
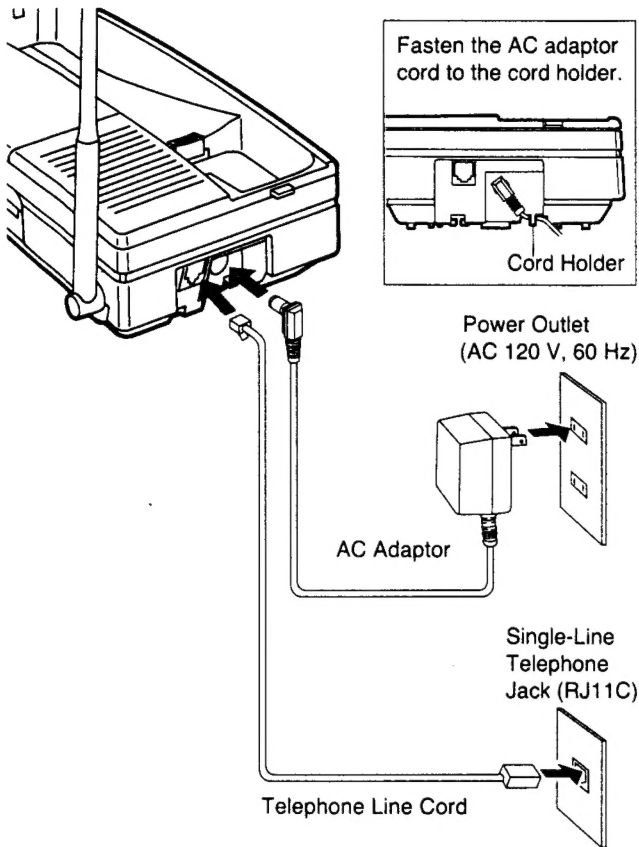


Fig. 9

Ref. No.	Procedure	Shown in Fig.—	To remove —.	Remove —.
1	1	4	Lower Cabinet	Screws (3×12) ..... (A)×5
2	1, 2	5	Printed Circuit Board	Screws (3×10) ..... (B)×2
3	3, 4	6	Rear Cabinet	Remove the battery compartment cover
4		7		Screw (2.6×12) ..... (C)×1
5	3-5	8	Printed Circuit Board	Screw (2.6×10) ..... (D)×1
6	3-6	9		Screws (2.6×10) ..... (E)×3

## CONNECTION TO A TELEPHONE LINE



### Notes:

- USE ONLY Panasonic AC ADAPTOR KX-A11-5. The adaptor must remain connected at all times.
- The unit will not function during a power failure. We recommend you connect a reserve telephone on the same line for power failure protection.

**This connection is for U.S.A. version only.**

Refer to the simplified manual (cover) for Canada or other areas.

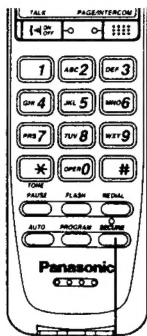
Fig. 10

## OPERATIONS

### NEW OPERATIONS

#### SECURE GUARD

Because cordless telephones use wireless radio waves, the conversations can be tapped. "Secure guard" feature scrambles the frequencies of radio waves and guards your conversations from tapping by unauthorized persons.



SECURE Button and Indicator

While you are dialing or having a conversation, press the SECURE button.


- The SECURE indicator light is on and the unit switches to "secure guard" mode.
- To end the mode, press the SECURE button again during use. The SECURE indicator light goes out.

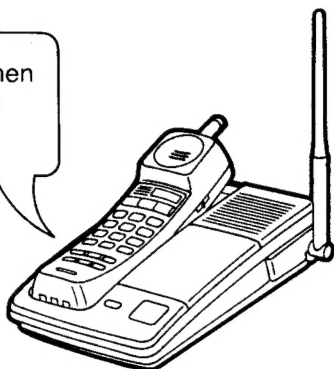
### Notes:

- Even if you hang up or set the POWER/RINGER switch to "OFF", the mode is maintained until you press the SECURE button again.
- Even if using this feature, there remains the possibility that your call is being tapped with special devices. If your call needs extreme confidentiality, use the speakerphone or a standard telephone connected to the same telephone line.
- This feature may affect the sound quality of your telephone conversations.

## ON-HOOK DIALING

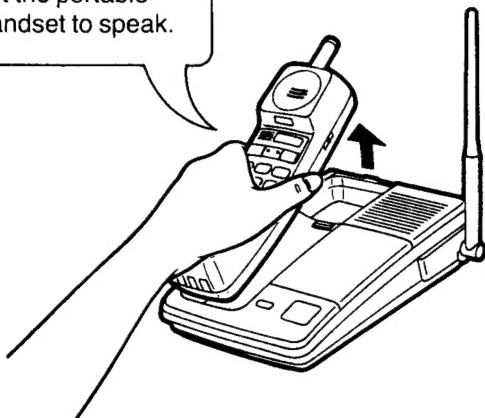
You can dial a telephone number while leaving the portable handset on the base unit **with the dialing buttons facing upward**. Make sure that the POWER/RINGER switch is set to "ON".

Press , then dial a telephone number.

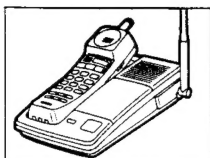


When the other party answers...

Lift the portable handset to speak.



1



Confirm the portable handset is placed on the base unit with the dialing buttons facing upward.

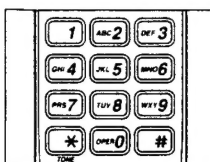
2



Press the TALK button.

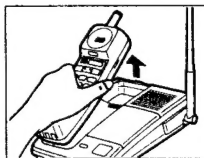
— You hear dial tone through the speaker of the base unit.

3



Dial a telephone number.

4

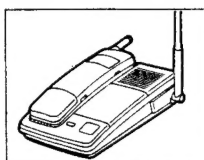


When the other party answers, lift the portable handset to speak.

## QUICK CHARGE

Generally it will take about **10 hours** to charge the discharged battery fully. Using the QUICK CHARGE button on the base unit, the charging time can be shortened to **3 hours**.

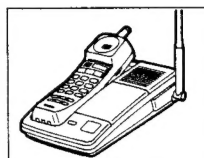
1



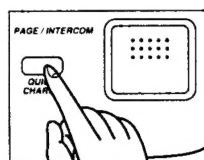
Place the portable handset on the base unit.

— The CHARGE indicator light is on.

OR



2



Press the QUICK CHARGE button.


— The button lights to show the unit is in "quick charge" mode.  
— When the battery is fully charged, the light flashes.

### Notes:

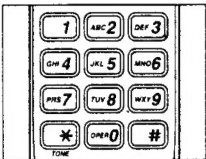
- If you lift the portable handset when in "quick charge" mode, the mode is canceled. To resume "quick charge" mode, start again from step 1.
- If you press the QUICK CHARGE button when the battery is fully charged, the button lights, but soon will change to flashing.
- To stop the flashing of the QUICK CHARGE button, press the button. The light goes out.


## NORMAL OPERATIONS

### MAKING CALLS

- 

Lift the portable handset and press the TALK button to get dial tone.

— The TALK indicator light is on and the channel number is displayed.
- 

Dial a telephone number.
- 


To hang up, press the TALK button or place the portable handset on the base unit.

— The TALK indicator light goes out.

### ANSWERING CALLS

#### With the portable handset

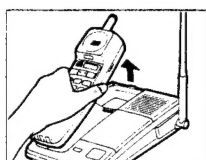
Make sure that the POWER/RINGER switch is set to "ON", or the portable handset will not ring.


- 

**If the portable handset is off the base unit:**  
When the telephone rings, press the TALK button to answer the call.

— The TALK indicator light is on.

OR



- 

**If the portable handset is on the base unit:**  
When the telephone rings, lift the portable handset to answer the call.

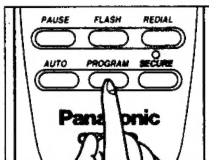
To hang up, press the TALK button or place the portable handset on the base unit.

— The TALK indicator light goes out.

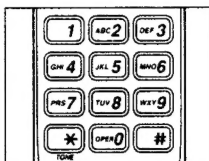
### AUTOMATIC DIALING

#### Storing phone numbers in memory

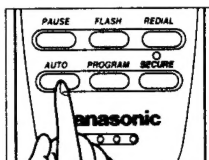
The dialing buttons (0 through 9) function as memory stations for automatic dialing. A 16-digit phone number can be stored in each station.

- 

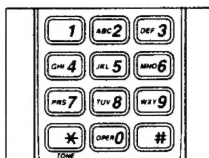
Press the PROGRAM button.

— "PROG" is displayed to show the unit is in the programming mode.
- 

Enter a phone number up to 16 digits.

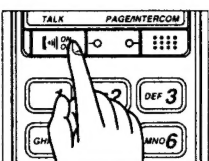
— The entered number is displayed one digit at a time.
- 

Press the AUTO button.

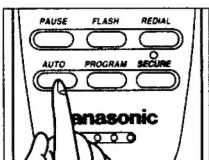
— " - - " is displayed.
- 

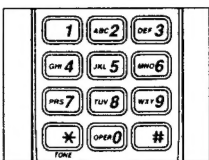
Press one of the dialing buttons (0 through 9) to select a memory station.

#### Dialing a stored number from memory

- 

Press the TALK button to get dial tone.

— The TALK indicator light is on and the channel number is displayed.
- 

Press the AUTO button.
- 

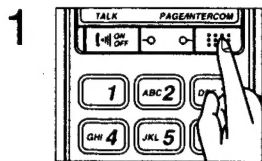
Press the dialing button (0 through 9) where the phone number you want to dial is stored.

— The stored number is dialed automatically.

## INTERCOM

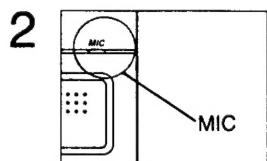
You can use the portable handset and the base unit as a 2-way intercom.

### Paging the base unit from the portable handset

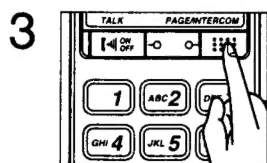


**The portable handset user:**  
Press the PAGE/INTERCOM button.

— Both units beep while the PAGE/INTERCOM button is pressed. When you release it, the unit automatically switches to the intercom mode. If there is no answer, press the button again to end the intercom.



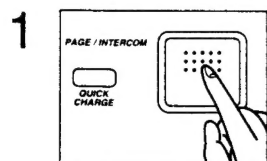
**The base unit user:**  
When the unit beeps and the paging party's voice is heard, answer through the MIC (microphone).



**The portable handset user:**  
When the conversation is over, press the PAGE/INTERCOM button.

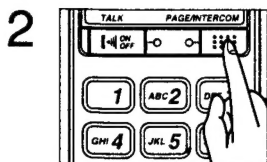
— Intercom calls can only be terminated by the portable handset.

### Paging the portable handset from the base unit

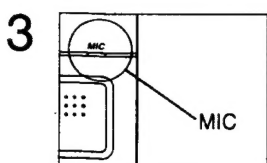


**The base unit user:**  
Press the PAGE/INTERCOM button.

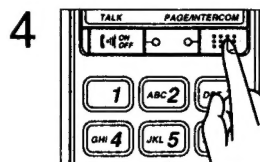
— Both units beep until the portable handset user answers the page. If there is no answer, press the PAGE/INTERCOM button again to stop paging.



**The portable handset user:**  
When the unit beeps and the PAGE/INTERCOM indicator flashes, press the PAGE/INTERCOM button to answer the page.



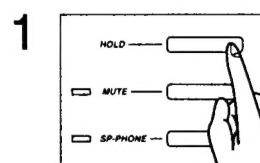
**The base unit user:**  
Speak to the paged party through the MIC.



**The portable handset user:**  
When the conversation is over, press the PAGE/INTERCOM button.

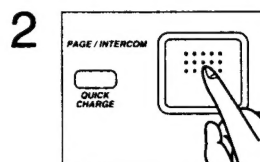
— Intercom calls can only be terminated by the portable handset.

### Transferring from the base unit to the portable handset

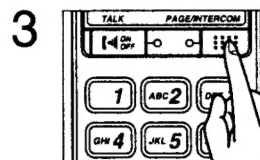


**The base unit user:**  
During a conversation, press the HOLD button to put the outside call on hold.

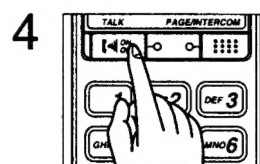
— The SP-PHONE indicator flashes.



Press the PAGE/INTERCOM button to page the portable handset.



**The portable handset user:**  
Press the PAGE/INTERCOM button to answer the page.



To answer the outside call, press the TALK button.

— The transfer is completed.

## ADJUSTMENTS (KX-T3950H)

If your unit have below symptom, adjust for each item following table of adjustment.

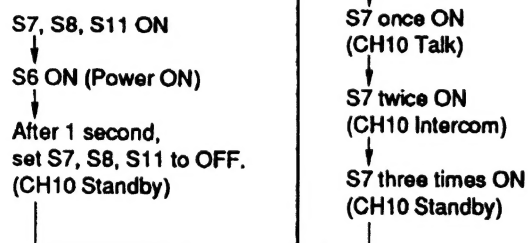
Symptom	Remedy
The base unit does not receive a call from portable handset.	Adjust the adjustment item (A)
The base unit does not transmit, and the transmit frequency is slipped.	Adjust the adjustment item (B)
The transmit frequency is slipped.	Adjust the adjustment item (C)
The transmit output is low, and the arrival distance is shorted between base unit and portable handset.	Adjust the adjustment item (D)
The reception sensitivity of base unit is wrong, the noise is occurred.	Adjust the adjustment item (E)

Unit condition:

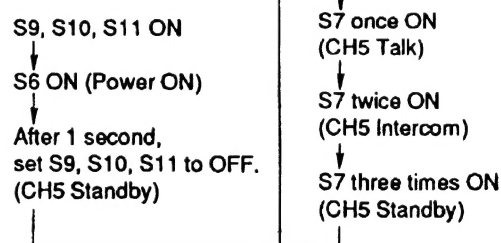
Remove the antenna from P.C. Board of the base unit.

How to set the test mode:

### 1. CH10 Test Mode



### 2. CH5 Test Mode



When replacing these parts, adjust as shown below table.

Replace Parts	Adjustment Items	Test Mode	Adjustment Points	Procedure
IC1, T5	(A) Phase Detector Voltage Adjustment (RX)	CH10 Talk	T5	1. Connect the Digital Voltmeter to $\nabla$ - $\nabla$ . 2. Adjust T5 (counterclockwise) so that the reading of the Digital Voltmeter is $3.2\text{ V} \pm 0.1\text{ V}$ .
D2, D3, T4	(B) Phase Detector Voltage Adjustment (TX)	CH10 Talk	T4	1. Connect the Digital Voltmeter to $\nabla$ - $\nabla$ . 2. Adjust T4 (counterclockwise) so that the reading of the Digital Voltmeter is $3.2\text{ V} \pm 0.1\text{ V}$ .
DUP1, T2, TC1, X1	(C) Frequency Adjustment (TX)	CH10 Talk	TC1	1. Connect the frequency counter to $\nabla$ - $\nabla$ . 2. Adjust TC1 so that the reading of the frequency counter is $46.970\text{ MHz} \pm 300\text{ Hz}$ .
T2, Q2	(D) Power Adjustment (TX)	CH10 Talk	T2	1. Connect the RF VTVM (connect $50\Omega$ resistor) to $\nabla$ - $\nabla$ . <div style="text-align: center;"> <p>18 PF 50Ω RF VTVM</p> </div> 2. Adjust T2 (clockwise) so that the reading of the RF VTVM is $150\text{ mV} \pm 10\text{ mV}$ .

When replacing these parts, adjust as shown below table.

Replace Parts	Adjustment Items	Test Mode	Adjustment Points	Procedure
T1, T6	(E) RF Adjustment (RX)	CH5 Talk	T1  T6	<ol style="list-style-type: none"> <li>1. Connect S.S.G. to <math>\nabla-\nabla</math>.</li> <li>2. Connect the loop simulator and AF VTVM to <math>\nabla-\nabla</math>. Connect the RF VTVM to <math>\nabla-\nabla</math>.</li> <li>3. Apply a 60 dB<math>\mu</math>V output from S.S.G. (modulation frequency 1 kHz, dev. 3 kHz).</li> <li>4. Apply a DC 48 V from loop simulator.</li> <li>5. Adjust T1 so that the reading of the RF VTVM is maximum output.</li> <li>6. Apply a 40 dB<math>\mu</math>V output from S.S.G. (modulation frequency 1 kHz, dev. 3 kHz), and adjust T6 so that reading of the AF VTVM is maximum output.</li> </ol>

Flow Solder Side View

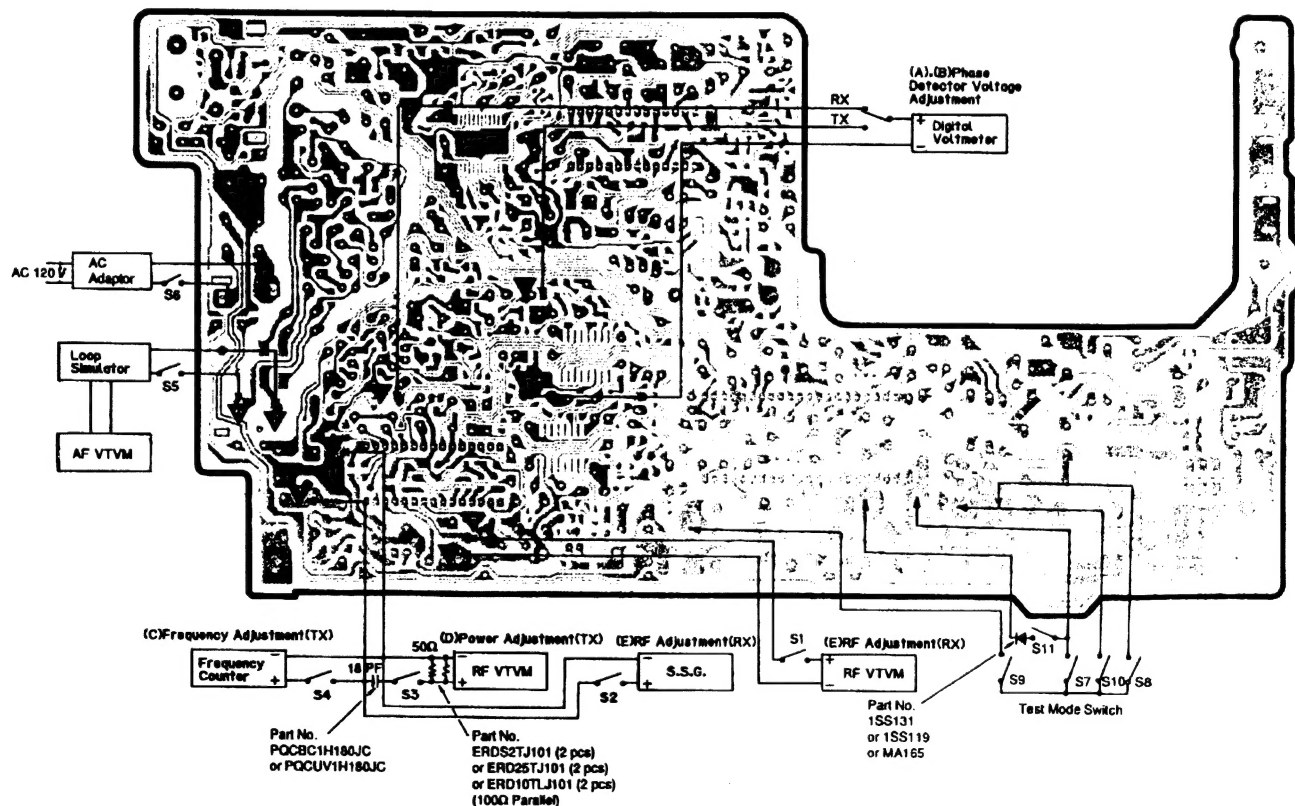


Fig. 11

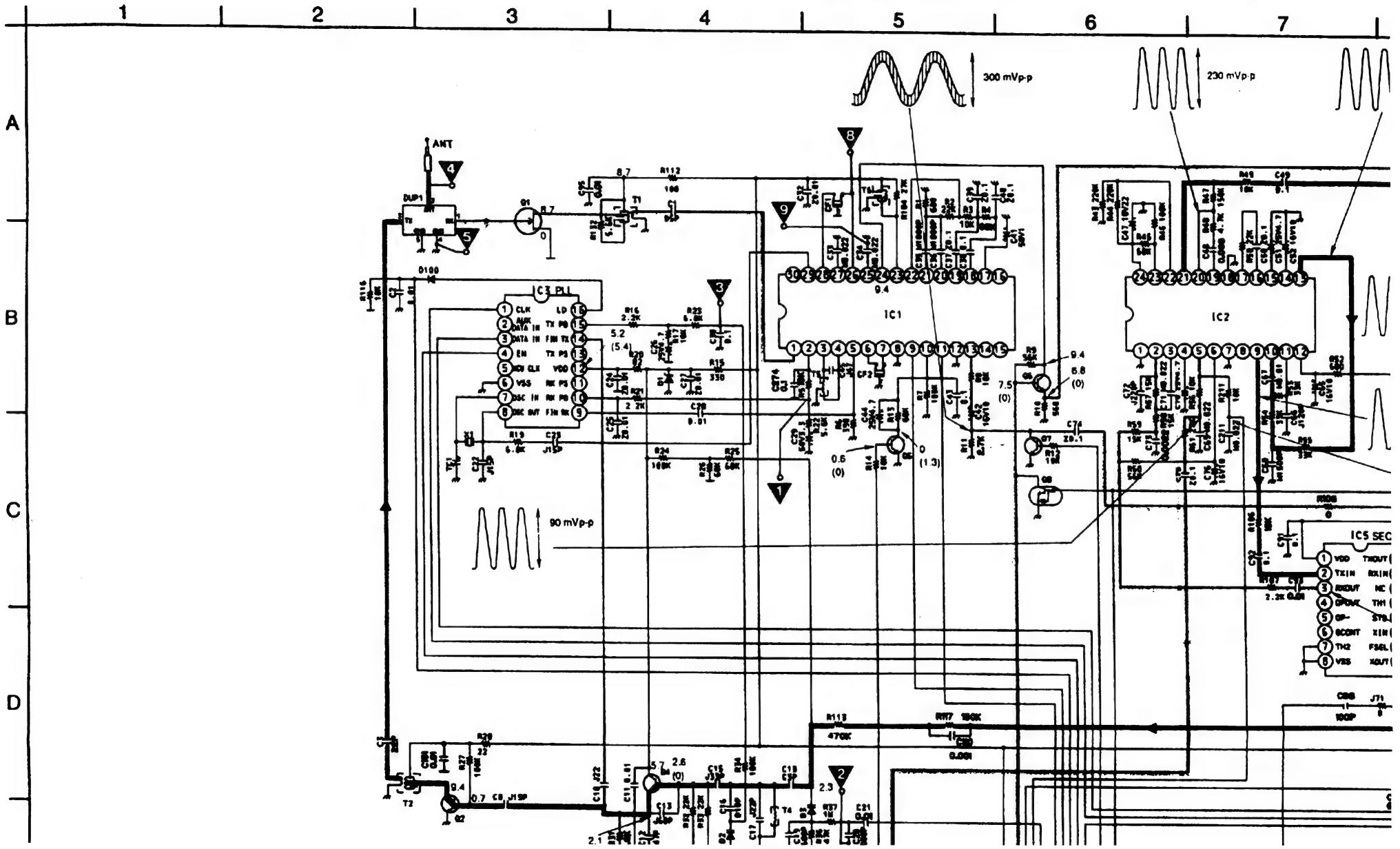


11

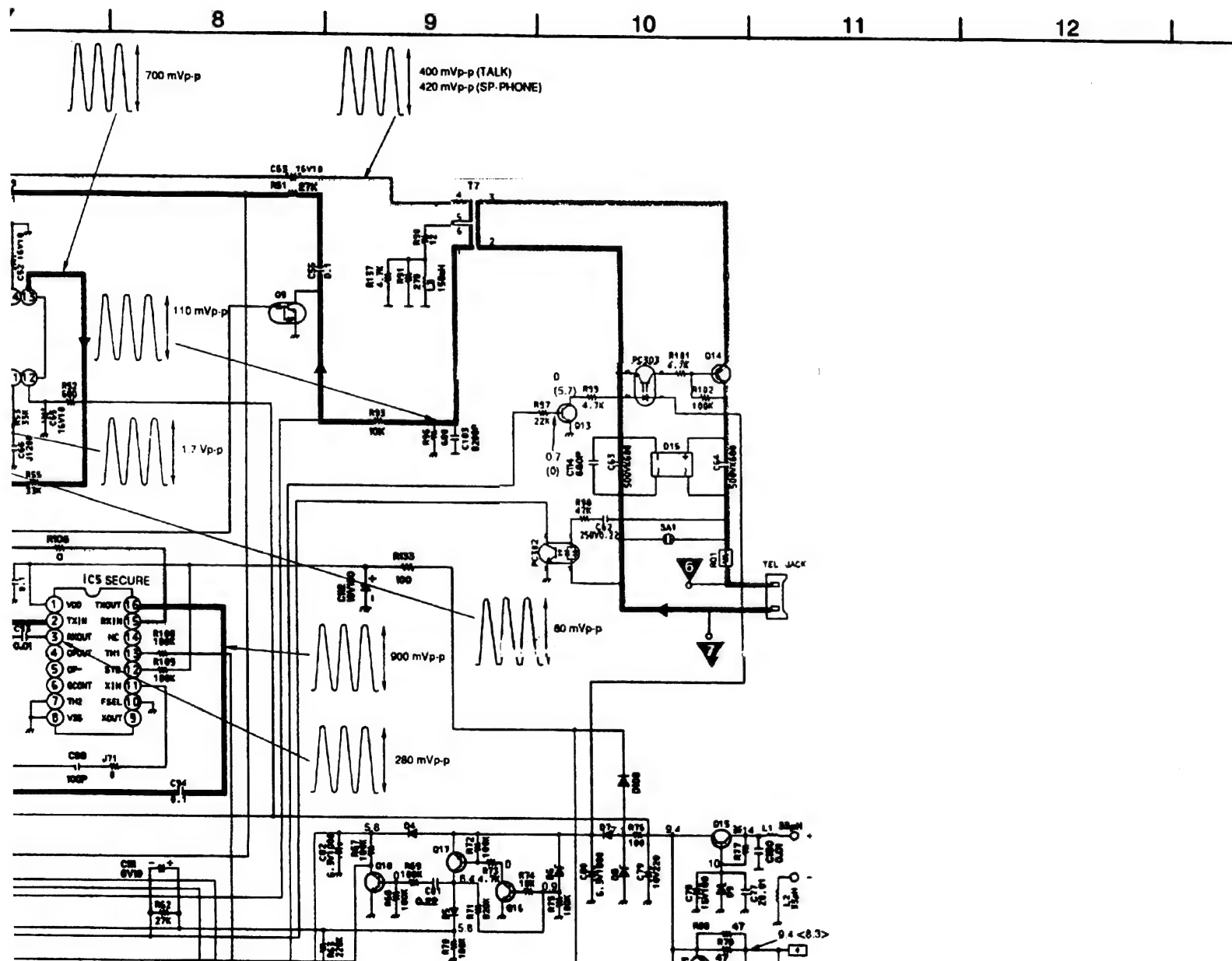
KX-T3950

KX-T3950

# SCHEMATIC DIAGRAM (KX-T3950)



## (X-T3950H)





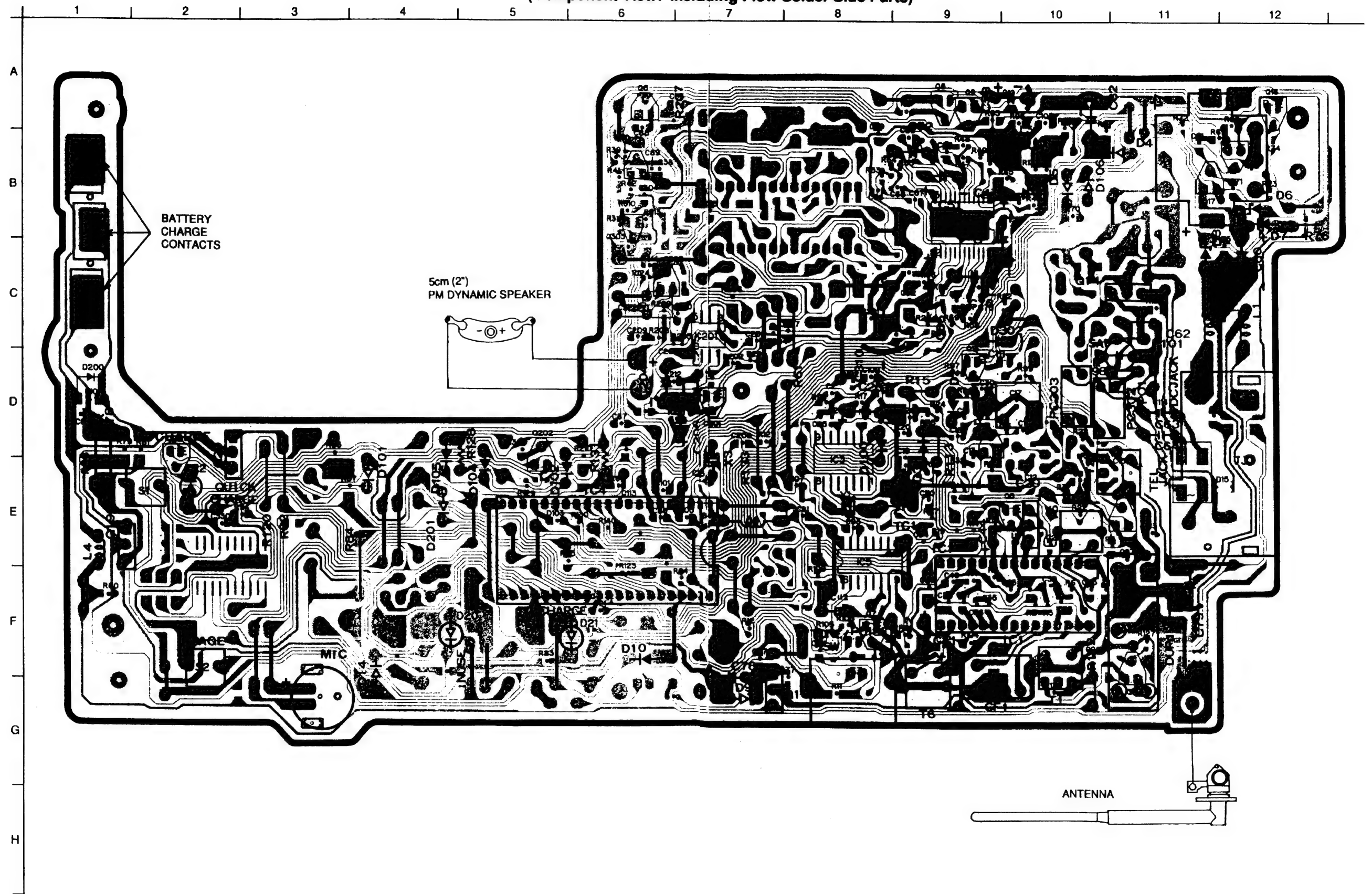


KX-T3950

KX-T3950

## CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM (KX-T3950H)

(Component View: Including Flow Solder Side Parts)

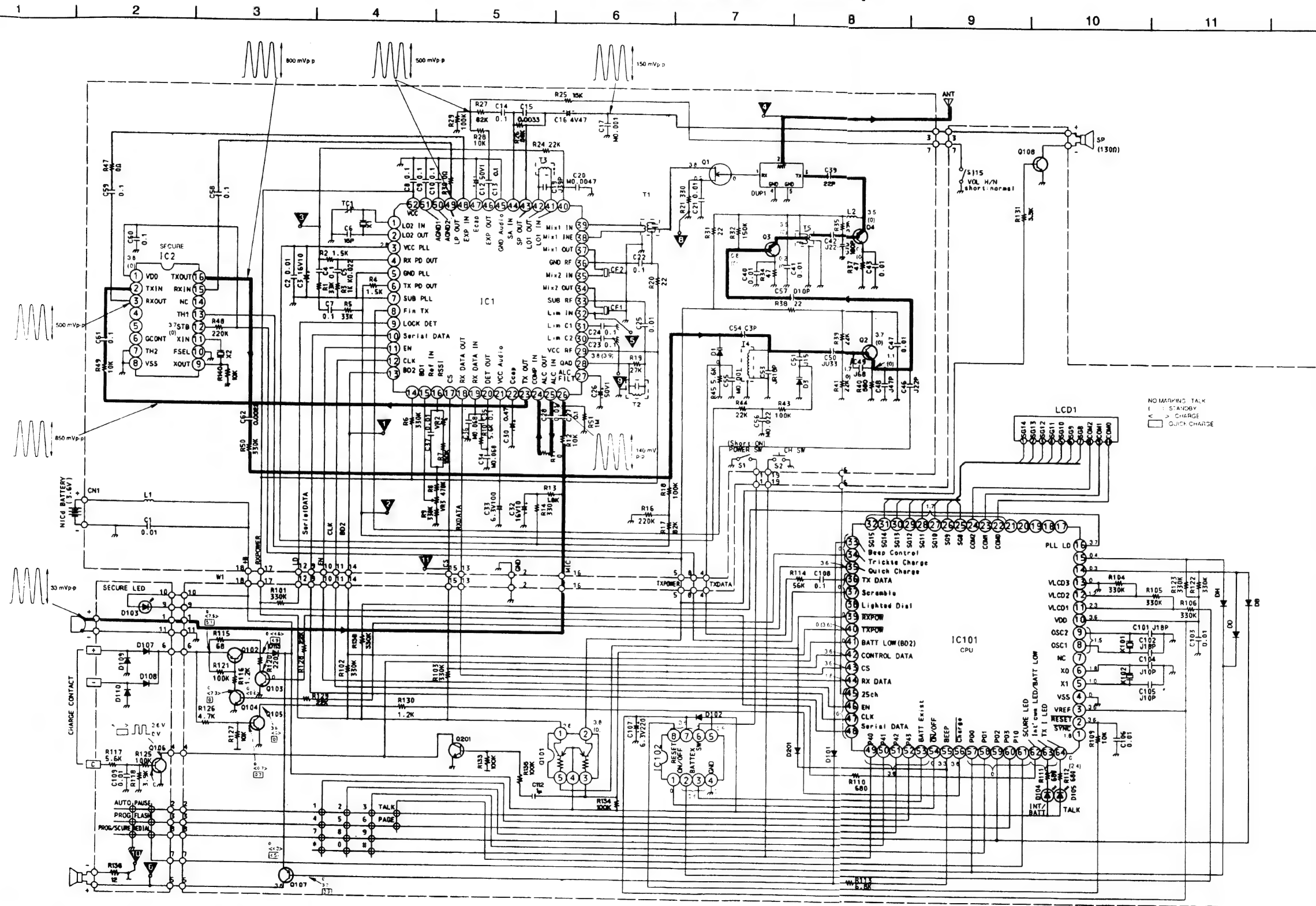


14-18 12

KX-T3950

KX-T3950

## SCHEMATIC DIAGRAM (KX-T3950R)



Notes:

- S1: Power/Ringer Switch
- S2: Channel Switch
- S101: Talk Switch
- S102: Page/Intercom Switch

- S103-S111, S113, S114: Dialing Switch
- S112: Tone Switch
- S115: Volume Selector Switch
- S116: Pause Switch

- S117: Flash Switch
- S118: Redial Switch
- S119: Auto Switch
- S120: Program Switch

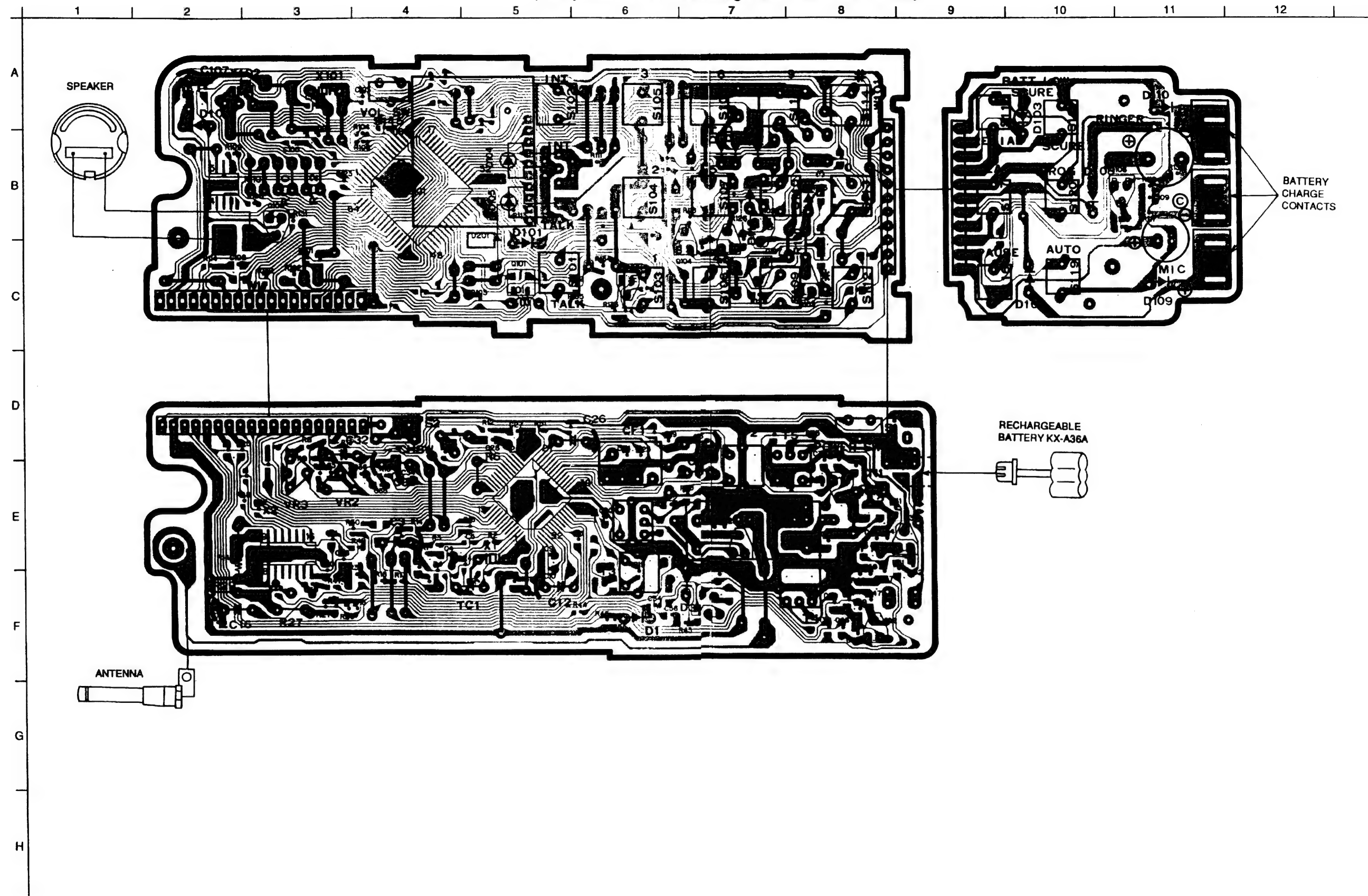
- S121: Secure Switch
- 14. DC voltage measurements are taken with electronic voltmeter from negative voltage line

This schematic diagram may be modified at any time with the development of new technology.



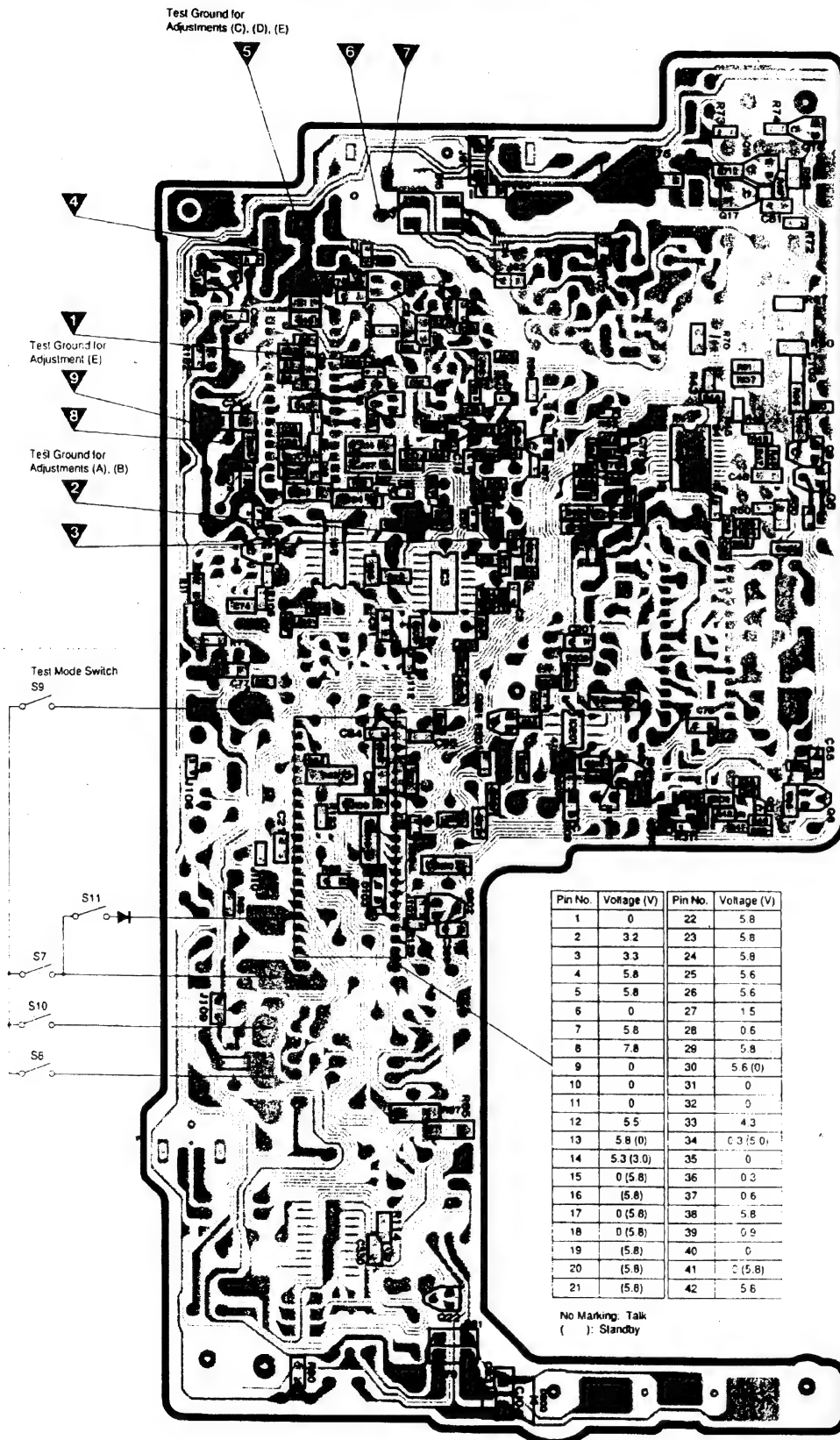
**KX-T3950**

**(Component View: Including Flow Solder Side Parts)**



14

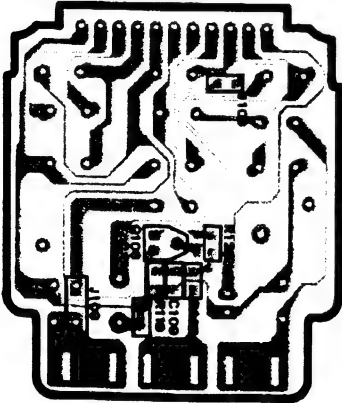
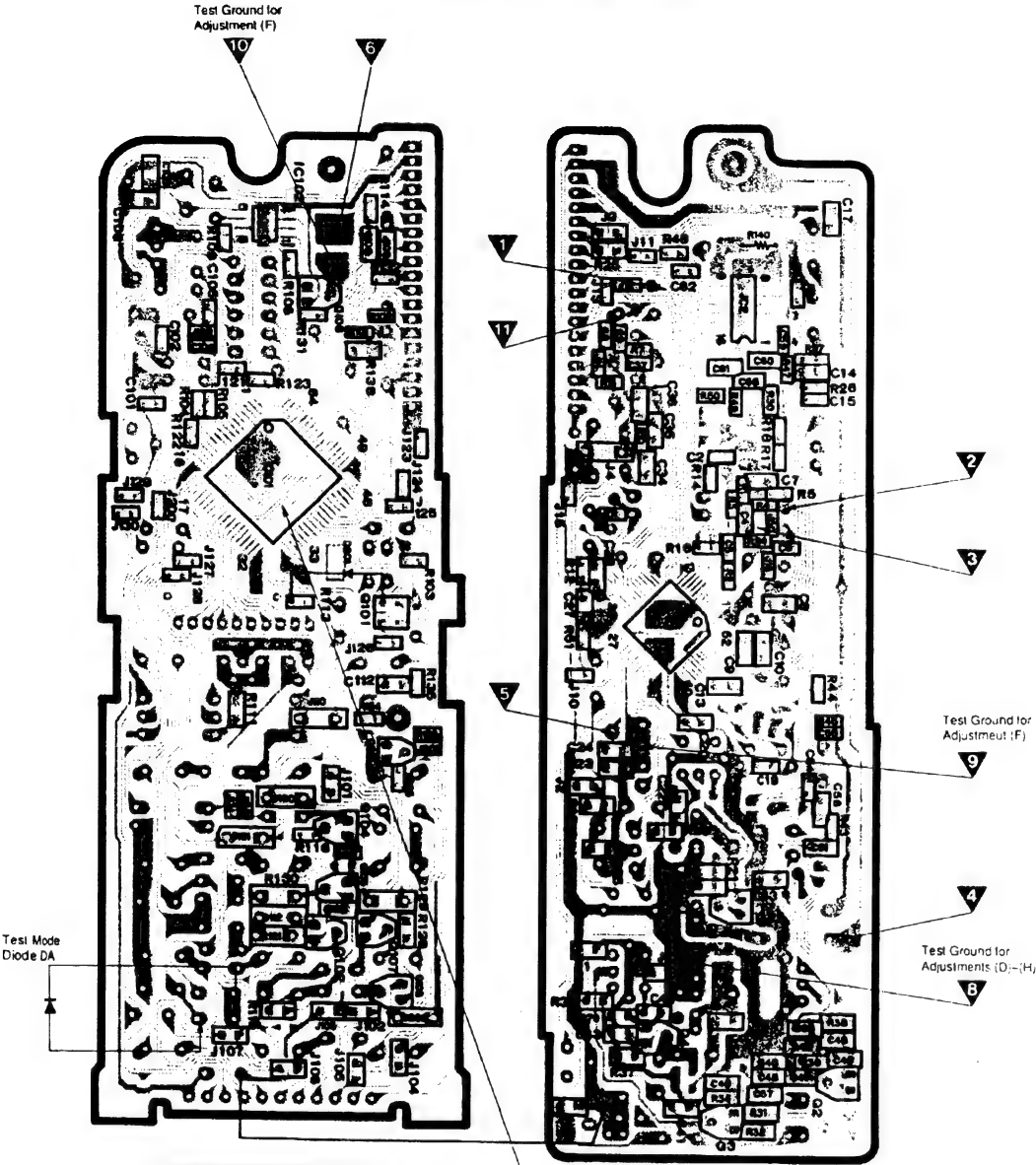
# CIRCUIT BOARD (KX-T3950H) (Flow Solder Side View)



Test Mode  
Mode DA



CIRCUIT BOARD (KX-T3950R)  
(Flow Solder Side View)



Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	1.8	34	0
2	3.6	35	3.6
3	3.6	36	0
4	0	37	0
5	1.0	38	
6	1.8	39	0
7		40	0 (3.6)
8	1.5	41	0
9	1.5	42	3.6
10	3.6	43	3.6
11	2.3	44	1.8
12	1.2	45-48	0
13	0	49-53	3.6
14	0.3	54	0
15	0.4	55	3.3
16	3.7	56	3.6
17-21		57-61	0
22-32	1.7	62, 63	2.4
33	0	64	0 (2.4)

No Marking: Talk  
( ) Standby

## ADJUSTMENTS (KX-T3950R)

If your unit have below symptom, adjust for each item following table of adjustment.

Symptom	Remedy
The movement of Battery Low Indicator is wrong.	Adjust the adjustment item (A)
The base unit does not receive a call from portable handset.	Adjust the adjustment item (B)
The base unit does not transmit, and the transmit frequency is slipped.	Adjust the adjustment item (C)
The transmit frequency is slipped.	Adjust the adjustment item (D)
The transmit output is low, and the arrival distance is shorted between base unit and portable handset.	Adjust the adjustment item (E)
The reception sensitivity of base unit is wrong, the noise is occurred.	Adjust the adjustment item (F)
Does not link between base unit and portable handset.	Adjust the adjustment items (G), (H)

### Unit Condition:

1. Remove the antenna lead wire from P.C. Board of portable handset.
2. Power Supply: DC 3.9 V
3. Power/Ringer switch: ON
4. Volume Selector: HIGH
5. Speaker Load: 130Ω

### How to set the test mode.

#### CH10 Test Mode

1. After connecting the diode DA, and apply a power supply DC 3.9 V.  
(The unit becomes CH10 standby.)
2. Press the talk switch.  
(The unit becomes CH10 Talk.)
3. After adjusting, remove the test mode diode DA.

When replacing these parts, adjust as shown below table.

Replace Parts	Adjustment Items	Test Mode	Adjustment Points	Procedure
VR3	(A) Battery Low Adjustment	CH10 Talk	VR3	1. Connect the oscilloscope to $\nabla$ -Ground. 2. Set the power supply voltage to DC 3.59 V, and adjust VR3 so that the reading of oscilloscope is 1 V $\pm$ 0.3 V.
IC1, TC1, X1, T4	(B) TX VCO Voltage Adjustment	CH10 Talk	T4	1. Connect the digital voltmeter to $\nabla$ -Ground. 2. Adjust T4 so that the reading of digital voltmeter is 2.0 V $\pm$ 0.1 V.
IC1, TC1, X1, T3	(C) RX VCO Voltage Adjustment	CH10 Talk	T3	1. Connect the digital voltmeter to $\nabla$ -Ground. 2. Adjust T3 so that the reading of digital voltmeter is 2.1 V $\pm$ 0.1 V.
TC1, X1, IC1	(D) TX Frequency Adjustment	CH10 Talk S4: @ side S5: OFF S6: ON	TC1	1. Connect the frequency counter to $\nabla$ - $\nabla$ . 2. Adjust TC1 so that the reading of frequency counter is 49.970 MHz $\pm$ 200 Hz.
T5	(E) TX output Adjustment	CH10 Talk S4: @ side S5: OFF S6: OFF	T5	1. Connect the RF VTVM to $\nabla$ - $\nabla$ . 2. Adjust T5 for 250 mV~500 mV output on RI VTVM.

When replacing these parts, adjust as shown below table.

Replace Parts	Adjustment Items	Test Mode	Adjustment Point	Procedure
T1, T2	(F) RX Adjustment  (Speaker Output)  (2nd IF Output)	CH10 Talk S4: Ⓐ side S5: OFF S6: OFF	T2   T1	1. Connect the S.S.G. to ④ - ⑧. 2. Connect the RF VTVM to ⑤ - ⑨. Connect the AF VTVM to ⑥ - ⑩. 3. Apply a 60 dBμV output from S.S.G. (modulation frequency 1 kHz, dev. 3 kHz) 4. Adjust T2 so that the reading of AF VTVM is maximum output. 5. Apply a 60 dBμV output from S.S.G. (modulation frequency 1 kHz, dev. 3 kHz) 6. Adjust T1 so that the reading of RF VTVM is maximum output.
VR2	(G) Carrier Sensitivity Adjustment	CH5 Stand-By	VR2	1. Connect the oscilloscope to ④ - Ground. 2. Connect the S.S.G. to ④ - ⑧. 3. Apply a 10 dBμV output from S.S.G. and adjust VR2 when oscilloscope becomes from high to low.
Refer to page 55.	(H) Data Modulation of Confirmation	CH10 Talk	—	1. Connect the FM deviation meter ④ - ⑧. 2. Keep pressing the flash button. 3. Confirm for a 5.5~8.0 kHz FM Deviation Meter reading.

Flow Solder Side View

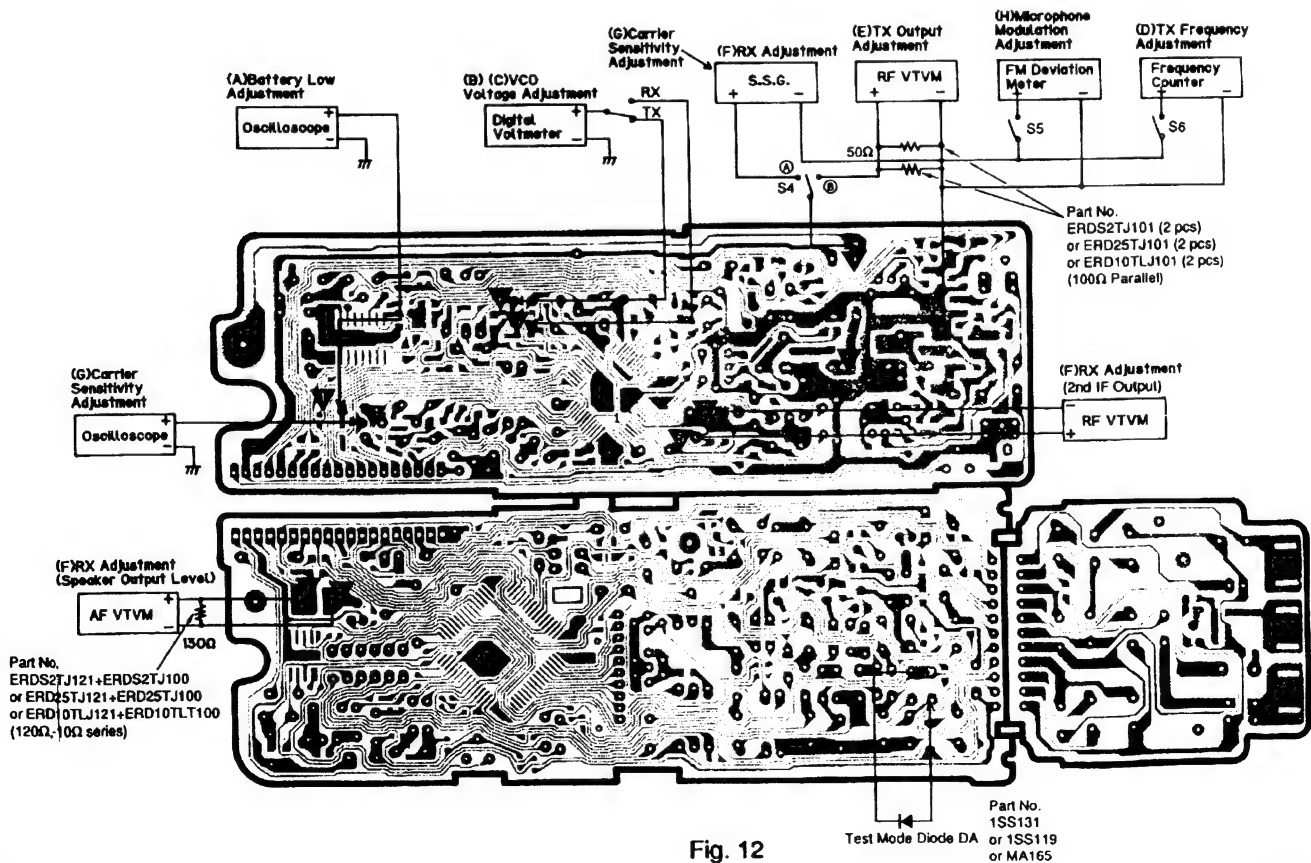


Fig. 12

# FREQUENCY TABLE (MHz)

	KX-T3950H		KX-T3950R	
	Transmit Frequency	Receive Frequency	Transmit Frequency	Receive Frequency
CH1	46.610	49.670	49.670	46.610
CH2	46.630	49.845	49.845	46.630
CH3	46.670	49.860	49.860	46.670
CH4	46.710	49.770	49.770	46.710
CH5	46.730	49.875	49.875	46.730
CH6	46.770	49.830	49.830	46.770
CH7	46.830	49.890	49.890	46.830
CH8	46.870	49.930	49.930	46.870
CH9	46.930	49.990	49.990	46.930
CH10	46.970	49.970	49.970	46.970

# CPU DATA KX-T3950H (Base unit)

■ IC4 MN150609KYA

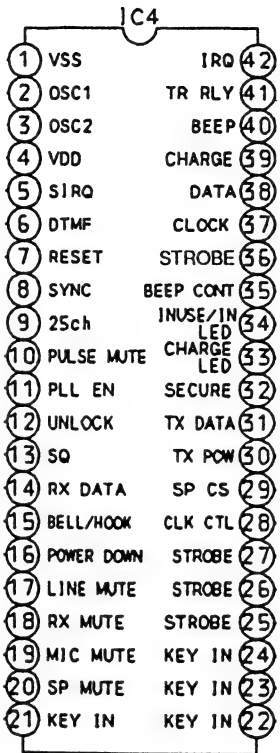


Fig. 14

# ACCESSORIES AND PACKING MATERIALS

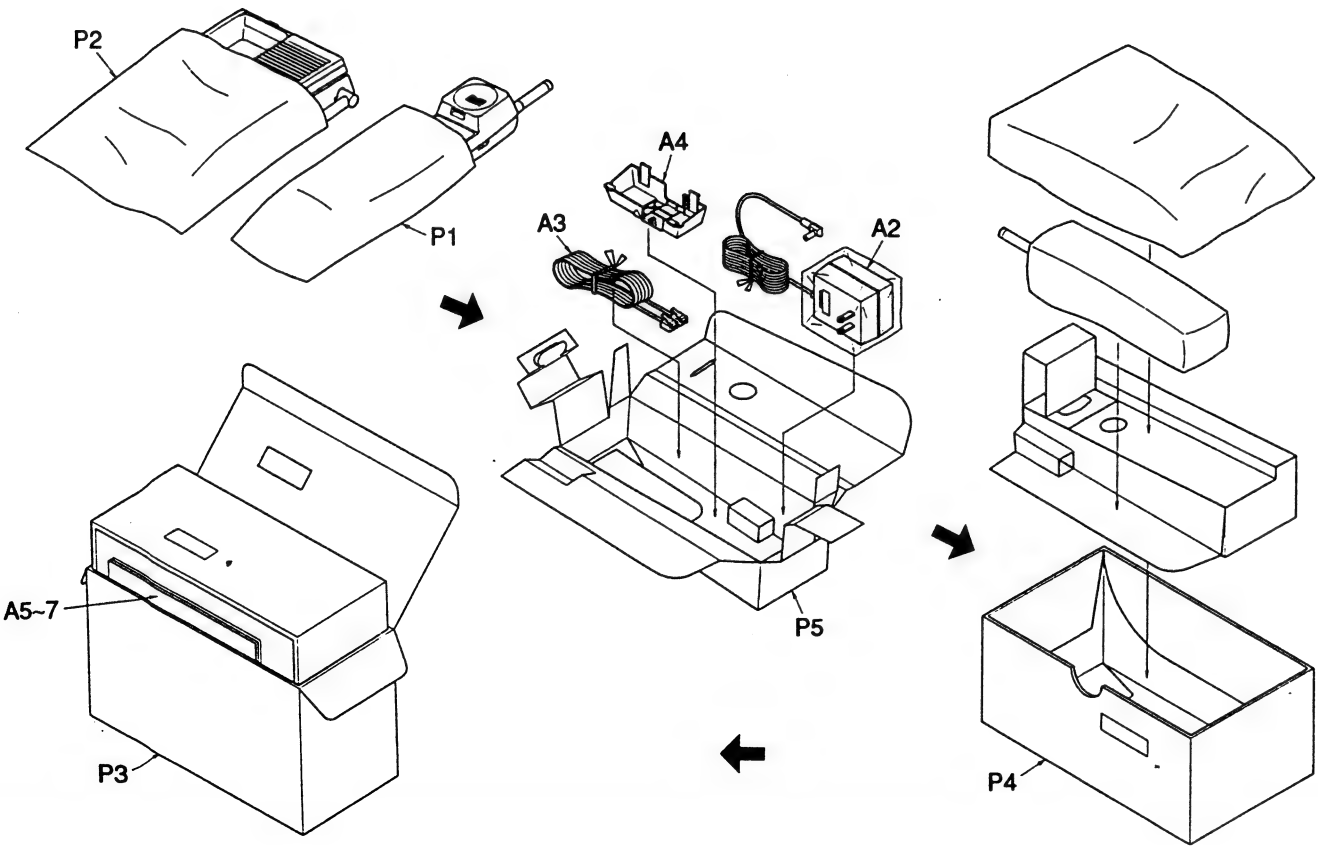


Fig. 13

Pin No.	Signal Name	I/O	High	High-Z	Low
1	GND		—	—	GND
2	CPU Clock	I	—	—	—
3	(3.581 MHz)	O	—	—	—
4	Power source	I	Normal	—	—
5	External interrupt input	I	Normal	—	—
6	DTMF	O	(Active)	Normal	(Active)
7	Reset	I	Normal	—	Reset
8	Synchronous signal output	O	—	—	—
9	25ch RF Control	O	15CH	—	Normal
10	(PULSE MUTE)	O	—	—	Normal
11	PLL EN	O	Active	—	Normal
12	PLL UNLOCK	I	Unlock	—	Lock
13	SQUELCH	I	Strong electric field	—	Weak electric field
14	RX DATA	I	1	—	0
15	Hook/Bell	I	Off Hook	—	Bell in
16	Power Down	I	Normal	—	Down
17	Line MUTE	O	Mute	—	Unmute
18	RX MUTE	O	Mute	—	Unmute
19	MIC MUTE	O	Mute	—	Unmute
20	SP MUTE	O	Mute	—	Unmute
21	Key in	I/O	Normal	—	Key in

Pin No.	Signal Name	I/O	High	High-Z	Low
22	Key in	I/O	Normal	—	Key in
23	Key in	I/O	Normal	—	Key in
24	Key in	I/O	Normal	—	Key in
25	Option Strobe	O	—	Normal	Active
26	Option Strobe	O	—	Normal	Active
27	Option Strobe	O	—	Normal	Active
28	PLL Clock Control	O	—	Serial operation	Normal
29	SP-CS	O	OFF	—	ON
30	TX POWER	O	ON	—	OFF
31	TX DATA	O	1	—	0
32	SCRAMBLE	O	—	—	Normal
33	CHARGE LED	O	—	OFF	ON
34	IN USE LED	O	—	OFF	ON
35	BEEP Control	O	—	Large volume	Small volume
36	Ext I/O Strobe	O	—	Active	Normal
37	Serial Clock	O	Normal	—	(Active)
38	Serial Data	O	(Active)	—	(Active)
39	Charge	I	Charge	—	Non
40	Beep Clock	O	(Active)	Normal	(Active)
41	TR-RLY	O	ON	—	OFF
42	External interrupt input	I	Normal	—	—

■ MN150609KYA (IC4) BLOCK DIAGRAM

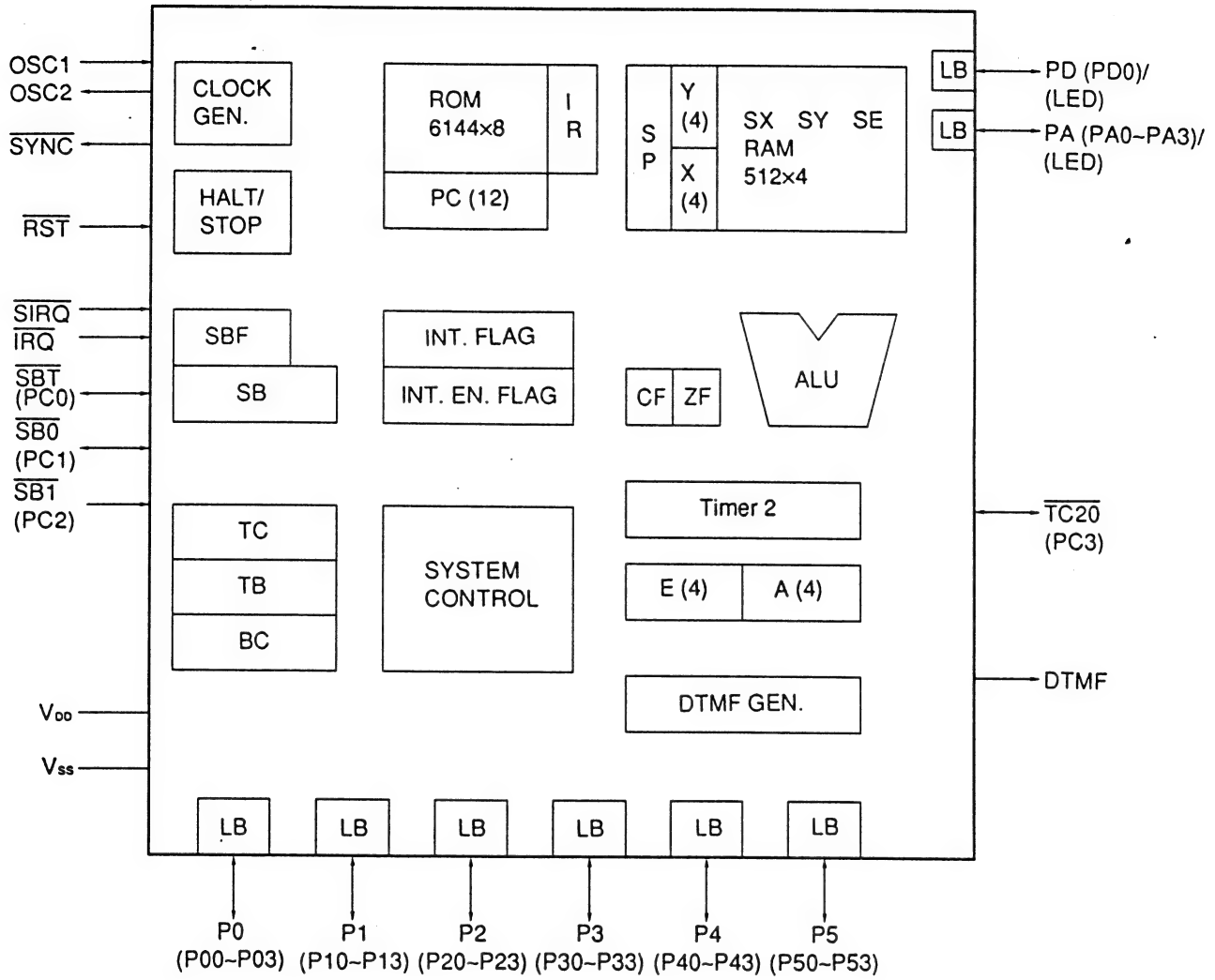


Fig. 15

## CPU DATA KX-T3950R (Portable Handset)

■ IC101 MN150804KZC

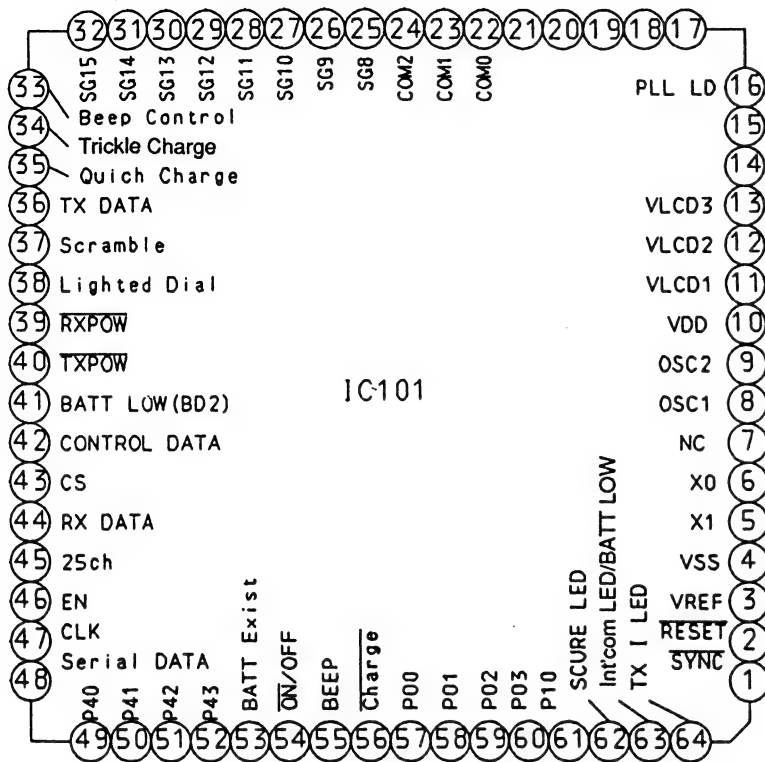


Fig. 16

Pin No.	Signal Name	I/O	High	High-Z	Low
1	Synchronous signal output	O			
2	RESET	I	Normal	—	Reset
3	Reference input for AD conversion	I			
4	GND	—			GND
5	Sub Clock (32.768 kHz)	I			
6		O			
7		—			
8	Main Clock (3.992 MHz)	I			
9		O			
10	Power source	—			
11	LCD power source	—			
12	LCD power source	—			
13	LCD power source	—			
14	Option IN	I	No	—	Yes
15	Option IN	I	No	—	Yes
16	PLL_Unlock	I	Unlock	—	Lock
17	Spare	I			
18	Spare	I			
19	Spare	I			
20	Spare	I			
21	Spare	I			
22	LCD common output	O			
23	LCD common output	O			
24	LCD common output	O			
25	LCD segment output	O			
26	LCD segment output	O			
27	LCD segment output	O			
28	LCD segment output	O			
29	LCD segment output	O			
30	LCD segment output	O			
31	LCD segment output	O			
32	LCD segment output	O			

Pin No.	Signal Name	I/O	High	High-Z	Low
33	Beep_CTL	O	Small volume	—	Large volume
34	Trickle Charge	O			Normal
35	Quick Charge	O			Normal
36	TX_DATA	O	(H/L)	—	Normal
37	Scramble	O		—	Normal
38	Lighted Dial	O	ON	—	OFF
39	RX POWER	O	OFF	—	ON
40	TX POWER	O	OFF	—	ON
41	Batt Low	I	Low	—	High
42	CHARGE (Control)	I	Charging stand	—	Base unit
43	Squelch	I	Weak	—	Strong
44	RX_DATA	I		—	
45	25ch RF switching	O		—	Normal
46	PLL_EN	O	Latch	—	Normal
47	PLL_Clock	O	Normal		
48	PLL_DATA	O	(Active)		
49	Key IN	I	No		Yes
50	Key IN	I	No		Yes
51	Key IN	I	No		Yes
52	Key IN	I	No		Yes
53	Batt Exist	I	Yes		No
54	ON/OFF	I	OFF		ON
55	Beep output	I/O		Normal	(H/L)
56	CHARGE	I	Normal		CHARGE
57	Key Strobe	O	—	Normal	Active
58	Key Strobe	O	—	Normal	Active
59	Key Strobe	O	—	Normal	Active
60	Key Strobe	O	—	Normal	Active
61	Key Strobe	O	—	Normal	Active
62	LED SECURE	O	—	OFF	ON
63	LED INTERCOM	O	—	OFF	ON
64	LED TALK	O	—	OFF	ON

■ MN150804KZC (IC101) BLOCK DIAGRAM

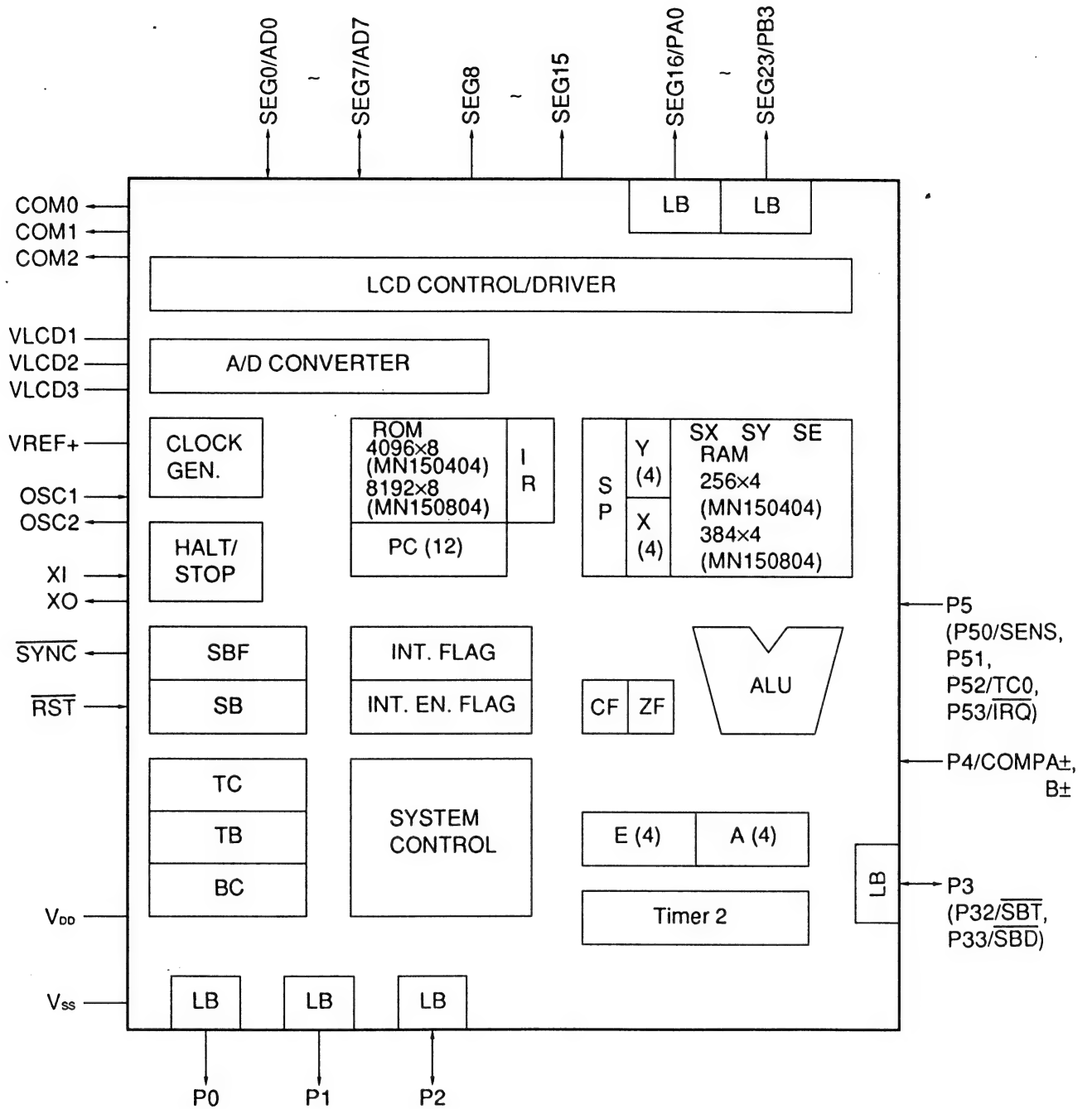


Fig. 17

# EXPLANATION OF CPU DATA COMMUNICATION

## 1. Calling

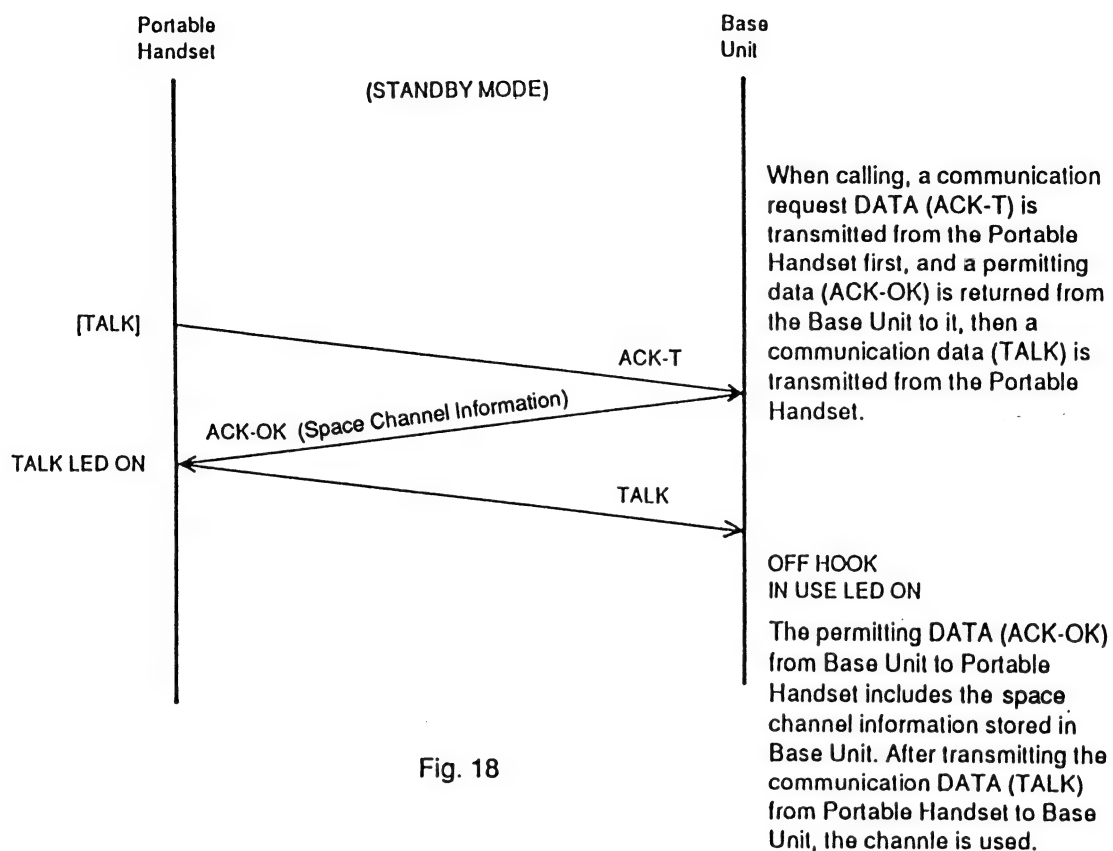


Fig. 18

## 2. To terminate Communication

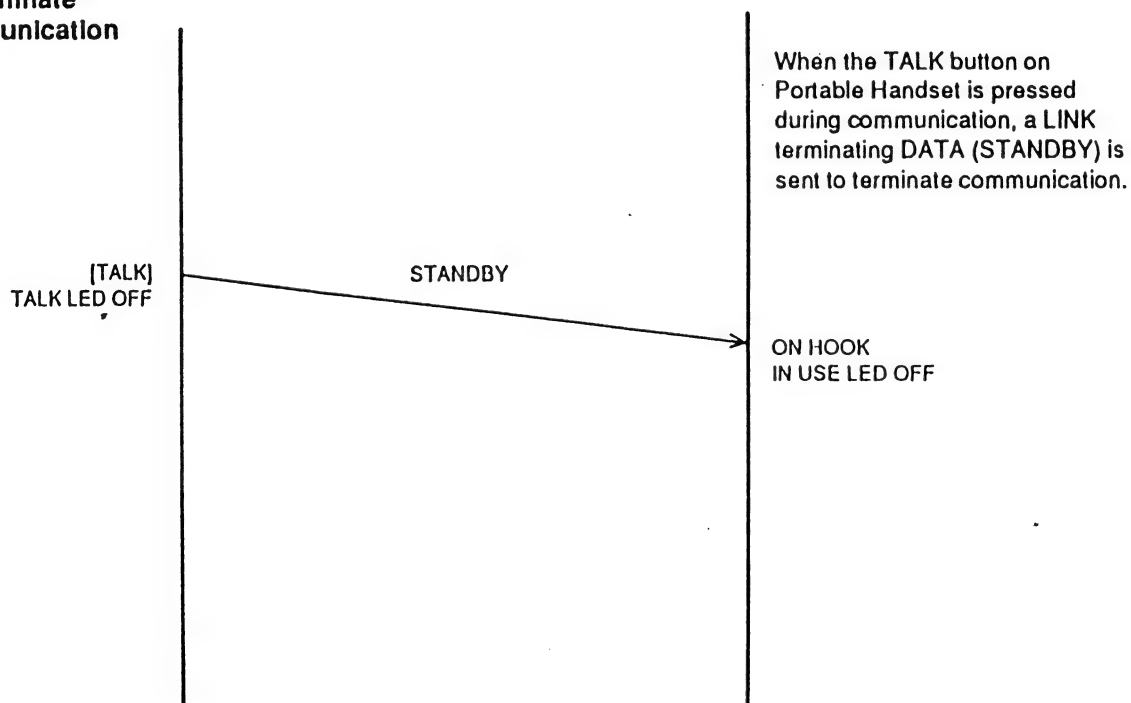


Fig. 19



### 3. Ringing

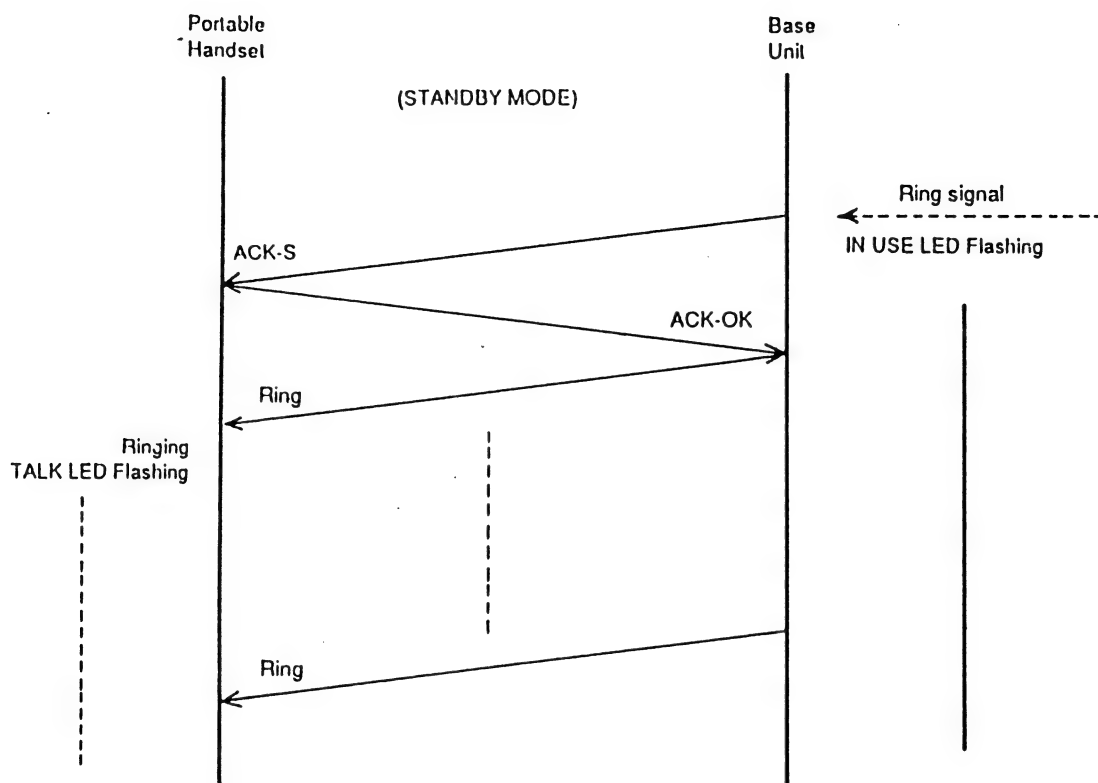


Fig. 20

After detecting the Ring signal from circuit, the Base Unit sends a LINK form requesting DATA (ACK-S) to the Portable Handset. When receiving this data, the Portable Handset returns a permitting DATA (ACK-OK) to the Base Unit. After receiving the returned DATA from the Portable Handset, the Base Unit sends a ring signal DATA (Ring), then the Portable Handset starts ringing.

### 4. Ports for transmitting and receiving of data

Portable Handset: transmitting...36 Pin    receiving...44 Pin

Base Unit:            transmitting...31 Pin    receiving...14 Pin

### 5. Waveform of DATA used for cordless transmission and reception

The DATA which is transmitted from the Portable Handset to the Base Unit is combination of DATA 0, DATA 1, DATA Delimt, Pre data and End data.

The DATA which is transmitted from the Base Unit to the Portable Handset is combination of DATA 0, DATA 1, DATA Delimt, Pre data and End data.

## PORTABLE HANDSET

## Transmitting DATA Format

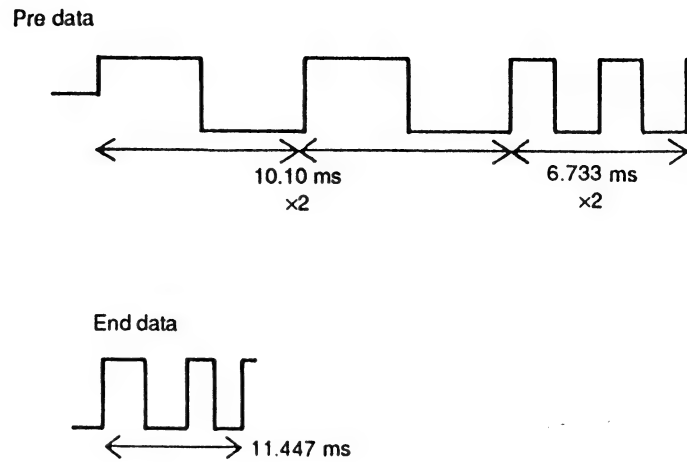
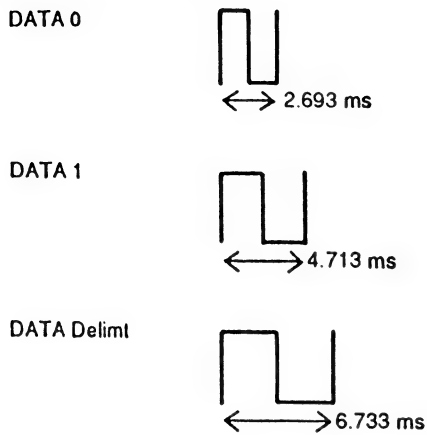


Fig. 21

## BASE UNIT

## Transmitting DATA Format

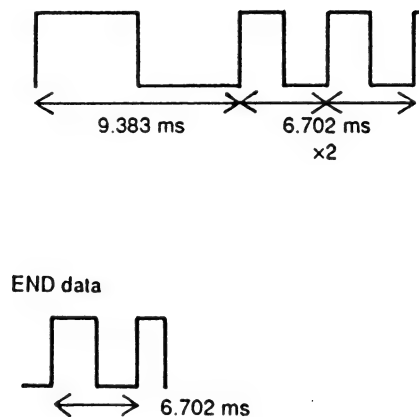
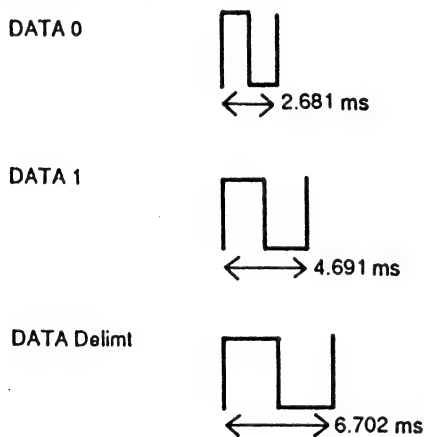


Fig. 22

## 6. When LINKing

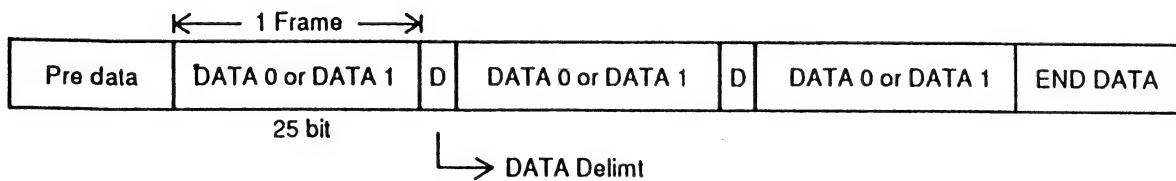


Fig. 23

When LINKing from the Portable Handset (when becoming STBY to TALK), DATA is transmitted in above format. The combined portion of DATA 0 and DATA 1 is transmitted in LINK requesting DATA format first. Then, when LINK OK (ACK-OK) DATA is returned from the Base Unit, it is sent as LINK form DATA after changing the combination of DATA 0 and DATA 1. And the DATA Delimt is between each Frame as a stop.

The contents of LINK requesting DATA and LINK form DATA are different depending on each operation.

## 7. Pulse Dial

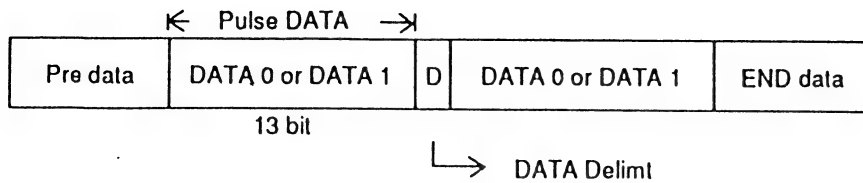


Fig. 24

When executing Pulse Dial, the Pulse Dial DATA is transmitted from the Portable Handset to the Base Unit in above format. The combination of DATA 0 and DATA 1 are changed by each Dial No. And the DATA Delimt is between each Frame as a stop. The number of Frame is 2.

## 8. Tone Dial

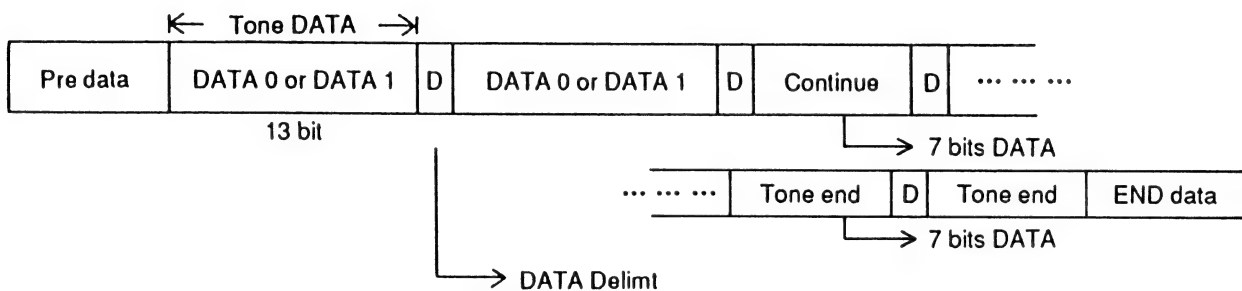


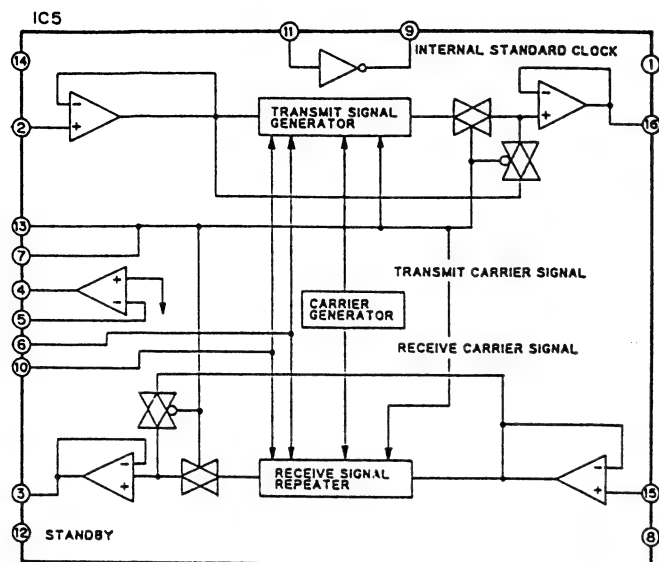
Fig. 25

When executing Tone Dial, Tone Dial DATA is transmitted from the Portable Handset to the Base Unit in above format. The DATA is changed by Dial No. as same as Pulse Dial. When Tone Dialing, DATA (Continue DATA) that the key is pressed continuously is sent to the Base Unit during the key is pressed. When depressing the key, the TONE Dial exterminating DATA (Tone end DATA) is sent, and the END data is sent finally.

## NOTE

1,000 kinds of the security code are available for the model KX-T3950. Each time the portable unit is set on the cradle of the base unit (for charging), the CPU automatically change the security code.

## EXPLANATION OF IC TERMINALS



Base Unit

IC5 PQVIM64021FP

Portable Handset

IC2 PQVIM64021FP

Fig. 26

Pin name	Function	Pin No.	I/O	Description															
Vdd	Power source	1		+Power source															
Vss	GND	8		For ground connection															
NC	Not connected	14																	
Xin	Input of oscillation circuit	11	Input	Oscillator connection terminal (external clock supply/cystal oscillation is enabled.)															
Xout	Output of oscillation circuit	9	Output																
Txin	Input of transmitted audio	2	Input	Input of transmitted audio signal (bias in the internal Vref)															
Txout	Output of transmitted audio	16	Output	Output of transmitted audio signal															
Rxin	Input of received audio	15	Input	Input of received audio signal (bias in the internal Vref)															
Rxout	Output of received audio	3	Output	Output of received audio signal															
OPout	Output of OP Amp.	4	Output	Output of optional OP Amp.															
OP	Input of OP Amp.	5	Input	Input of optional OP Amp.															
GCON	Gain control	6	Input	Control of transmitted/received signal level GCON=L: Tx=0 dB Rx=0 dB CGON=H: Tx=-6 dB Rx=+6 dB															
THRU1	Pass mode selection	13	Input	<table><tr><td>THRU1</td><td>THRU2</td><td>Pass mode</td></tr><tr><td>L</td><td>L</td><td>Transparent through pass</td></tr><tr><td>L</td><td>H</td><td>Filter through pass</td></tr><tr><td>H</td><td>L</td><td>Confidential talk pass</td></tr><tr><td>H</td><td>H</td><td>Confidential talk pass (Same mode as above)</td></tr></table>	THRU1	THRU2	Pass mode	L	L	Transparent through pass	L	H	Filter through pass	H	L	Confidential talk pass	H	H	Confidential talk pass (Same mode as above)
THRU1	THRU2	Pass mode																	
L	L	Transparent through pass																	
L	H	Filter through pass																	
H	L	Confidential talk pass																	
H	H	Confidential talk pass (Same mode as above)																	
THRU2	Pass mode selection	7	Input																
STB	Standby selection	12	Input	Standby mode selection (Standby mode when STB is L)															
FSEL	Selection of dividing ratio of internal clock	10	Input	When 3.58/3.69 MHz is used, FSEL is L. When 4.00/4.19 MHz is used, FSEL is H.															

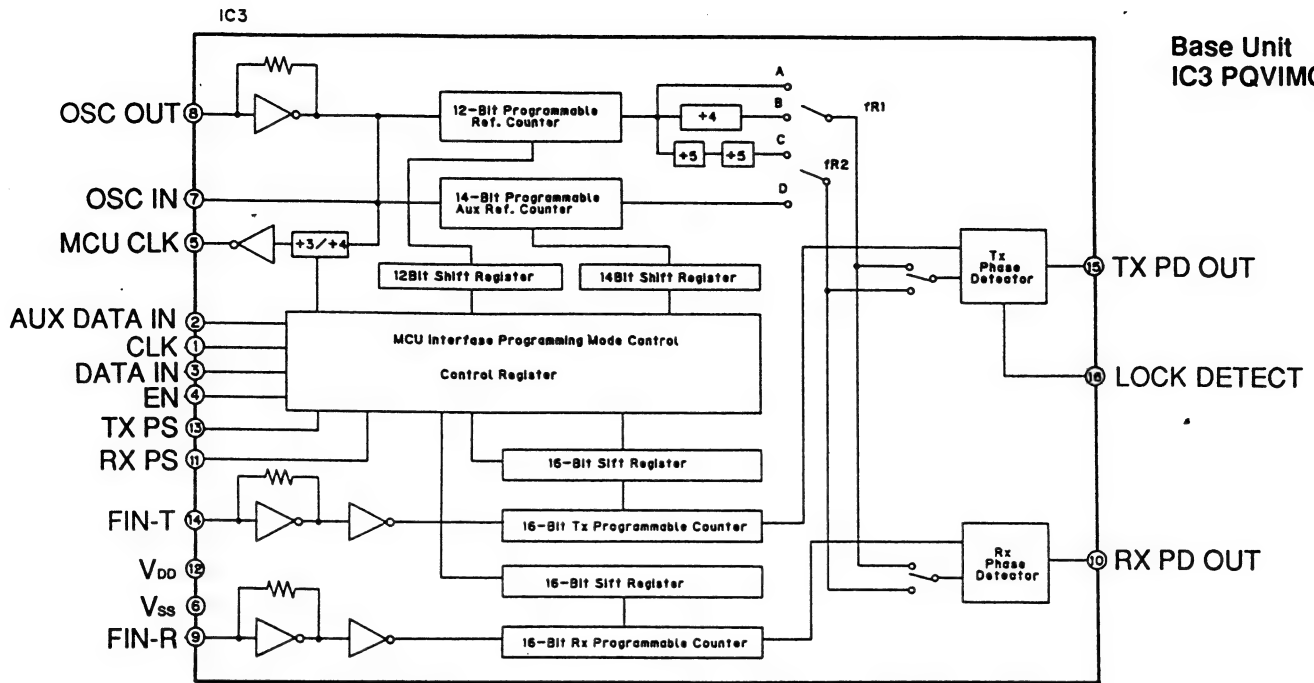
Base Unit  
IC3 PQVIMC145162

Fig. 27

## Pin Description

**OSC In, OSC out**

These pins form a reference oscillator when connected to an external parallel-resonant crystal. OSC in may also serve as input for an externally generated reference signal which is typically ac-coupled.

**MCU-CLK**

These output pins provide a frequency signal of Crystal Frequency (OSC out)+3 or +4 which is controlled by the bit function of the Control Register.

This signal can be a clock source for the MCU and other system clock.

**Aux. DATA IN, DATA IN, CLK, EN**

These four pins provide an MCU Serial Interface for Programming the Reference Counter, the Transmit Channels Divider Counter, the Receive Channels Divider Counter and various Control of the PLL including the Power Saving Mode and the Programming Format.

**TX\_PS/f<sub>TX</sub>, RX\_PS/f<sub>RX</sub>**

For normal application, these Output Pins provide the status of the internal Power Saving Mode Operation. If the Tx-Channels Divider Counter circuitry is in Power Down Mode, the TX\_PS will output a "HIGH" state. Else if the Rx-Channels Divider Counter Circuitry is in Power Down Mode, RX\_RS will be set to "HIGH". These output pins can be applied for controlling the External Power Switch for the Transmitter and the Receiver to save MCU control pins.

**fin-T, fin-R**

fin-T, fin-R are inputs to the Transmit and Receive Divider Counter respectively.

These signals are typically driven from the Loop VCO and ac-coupled. The minimum input signal level is 200 mVp-p @ 60.0 MHz, Vdd=2.5 V.

**TXPDOUT, RXPDOUT**

These are 3-state outputs of the transmit and receive phase detectors for use as loop error signal or Phase Detector signal.

Frequency  $f_v > f_n$  or  $f_v$  leading: Output=Negative Pulse

Frequency  $f_v < f_n$  or  $f_v$  lagging: Output=Positive Pulse

Frequency  $f_v = f_n$  and Phase Coincidence: Output=High Impedance State

**LOCK DETECT**

Lock Detect Signal associated with the transmit loop. The lock output is set to "1" to indicate an out-of-lock condition.

**Vdd, Vss**

Vdd is the most positive Power Supply potential ranging from 2.5 to 5.5 volts with respect to Vss. Vss is the most negative supply potential and is usually connected to Ground.

## NEW CIRCUIT OPERATION (KX-T3950H)

### RECEIVER RF IF CIRCUIT

#### Circuit Operation:

The signal of 49 MHz band (49.67~49.99 MHz) which is input from ANT is filtered at DUP1, passes through the filter AMP of 49 MHz band at T1 and Q1, and is input to Pin 1 of IC1.

RX VCO which oscillates at T6 and Pins 3, 4 of IC1 is input to PLL IC (IC3), 1st local frequency is controlled to assigned channel by serial data which is output from Pins 11, 37 and 38 of IC4 (CPU), makes loop with Phase Detector Out and RX VCO, and locks 1st local frequency.

The input signal of Pin 1 of IC1 and 1st local frequency output from RX VCO are mixed at inside of IC1, then it passes through CF2, and 1st IF frequency of 10.695 MHz is generated. Farther, the 10.240 MHz and 10.695 MHz which are oscillated at X1 and Pins 7, 8 of IC3 are mixed at inside of IC1 and filtered at CF1, and 2nd IF 455 Hz is output.

Circuit Diagram

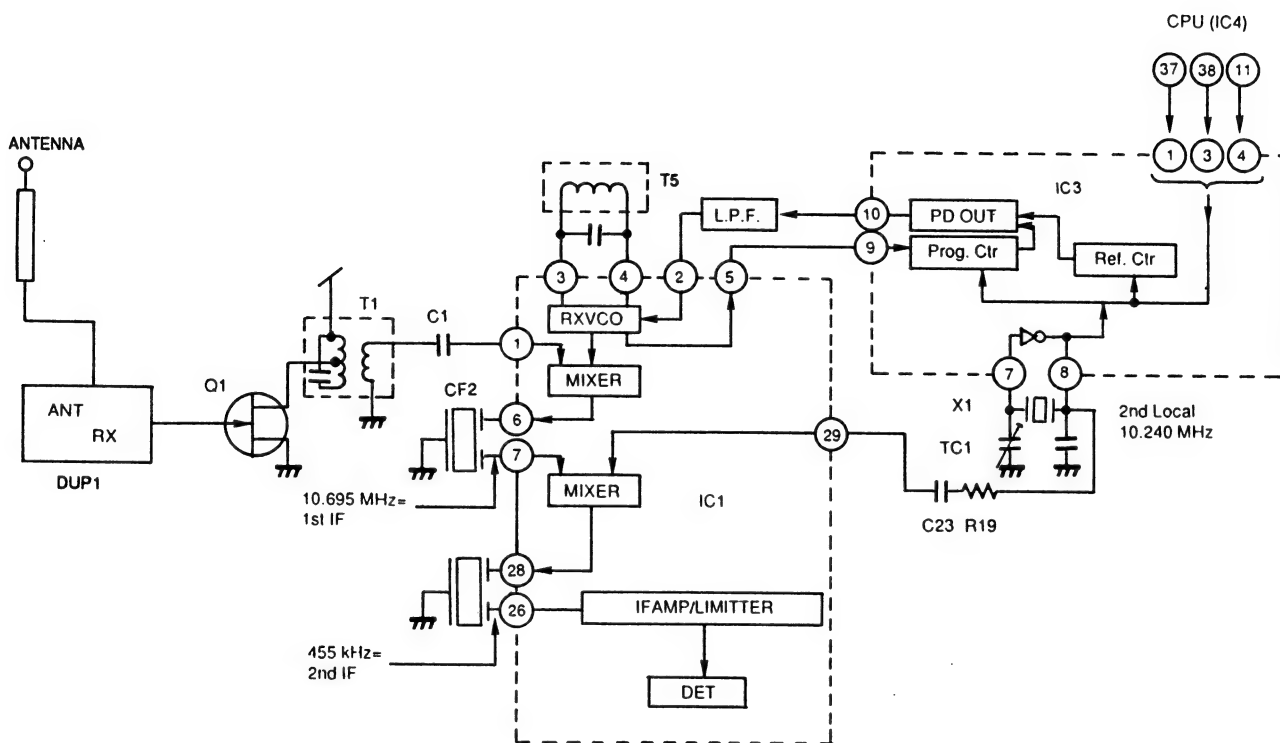


Fig. 28

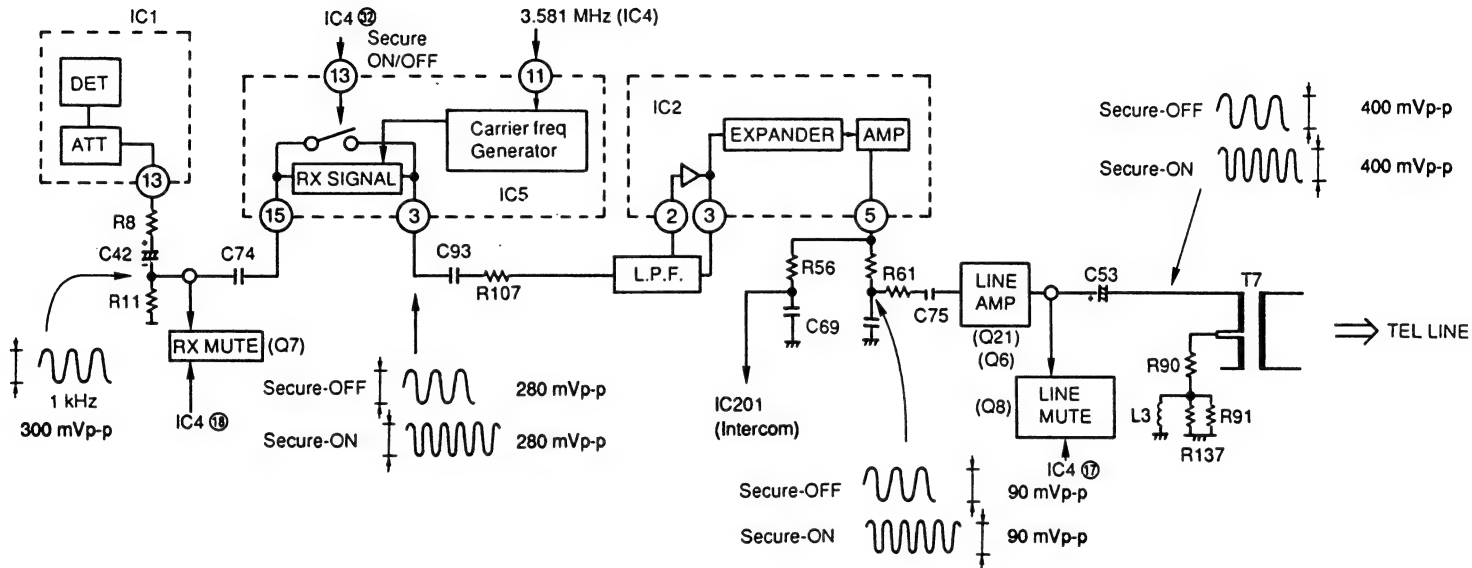
### RECEIVER SIGNAL CIRCUIT

#### Circuit Operation:

1. The detected signal passes through R8, C42 and C74, is input to Pin 15 of IC5 (Secure IC).
  2. In case of Secure ON, the inverted frequency of input frequency is output from pin 3 of IC5 by comparing with the standard frequency 3.2 kHz generated from oscillating frequency of 3.581 MHz (input from IC4).  
(Ex. When input  $f=1$  kHz, output  $f=2.30$  kHz)
- In case of Secure OFF, an input signal to Pin 15 of IC5 is output from Pin 3 as it is.

- Then, it goes through L.P.F. which consists of Pins 2, 3 of IC2 and external capacitor and resistor, and internal EXP/AMP of IC2, and is output from Pin 5 of IC2.
- Then it goes through Buffer Amp which consists of Q21 and Q6, and TEL LINE INTERFACE TRANS T7, and is output to TEL LINE.

Circuit Diagram



Note: When applying the SSG input level of reception 60 dBμV (3.0 kHz Deviation, f=1 kHz) from antenna, all waveform are measured.

Fig. 29

## TRANSMITTER SIGNAL CIRCUIT

### Circuit Operation:

- The signal input from TEL LINE goes through TEL LINE INTERFACE TRANS T7→R93, C49 and R49→Pins 21, 20 of IC2 Amp→LIMITER, COMPRESSOR, and is output from Pin 13 of IC2.
- Then, it goes through L.P.F. which consists of Pins 10, 11 of IC2 and external capacitor and resistor, and internal Amp of IC2, is output from Pin 9 of IC2, then goes through R106 and C92, and is input to Pin 2 of IC5.
- In case of Secure ON, the inverted frequency of input frequency is output from Pin 16 of IC5 by comparing with the standard frequency 3.2 kHz generated from oscillating frequency of 3.581 MHz (input form IC4). In case of Secure OFF, an input signal to Pin 2 of IC5 is output from Pin 16 as it is.
- The signal output from Pin 16 passes through C94, R117, C110 and R113, and is input to modulator circuit.

Circuit Diagram

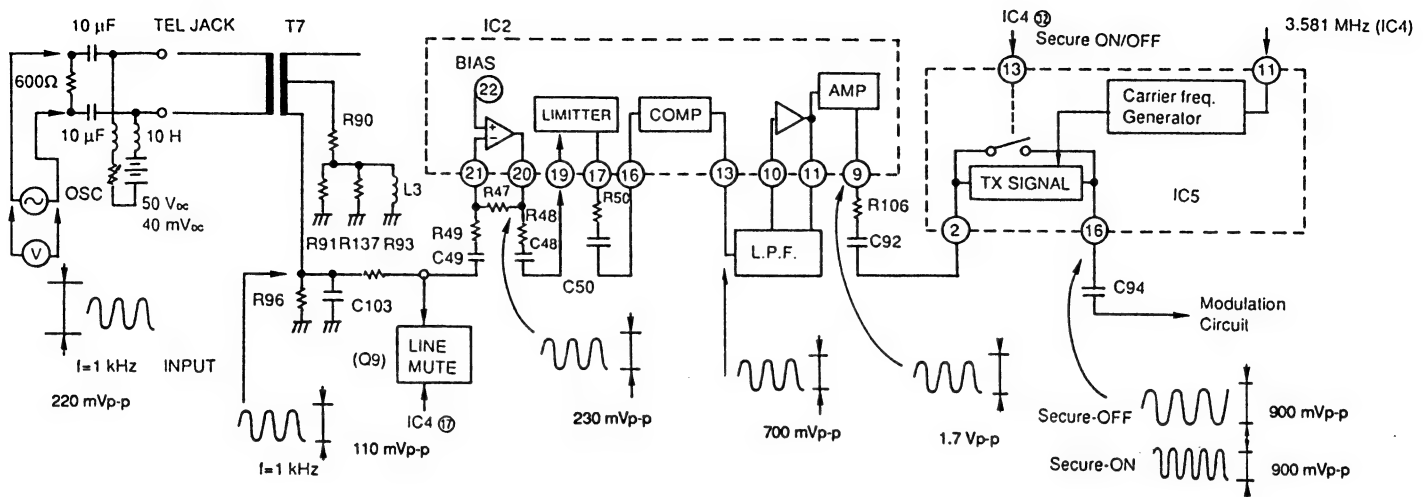


Fig. 30

## ■ INITIALIZATION CIRCUIT

### Function:

This circuit is used for initializing the microcomputer when the AC adaptor is connected.

### Circuit Operation:

When the unit is switched ON, then the voltage is shifted by D7, D4 and power is supplied to the CPU.

Circuit Diagram

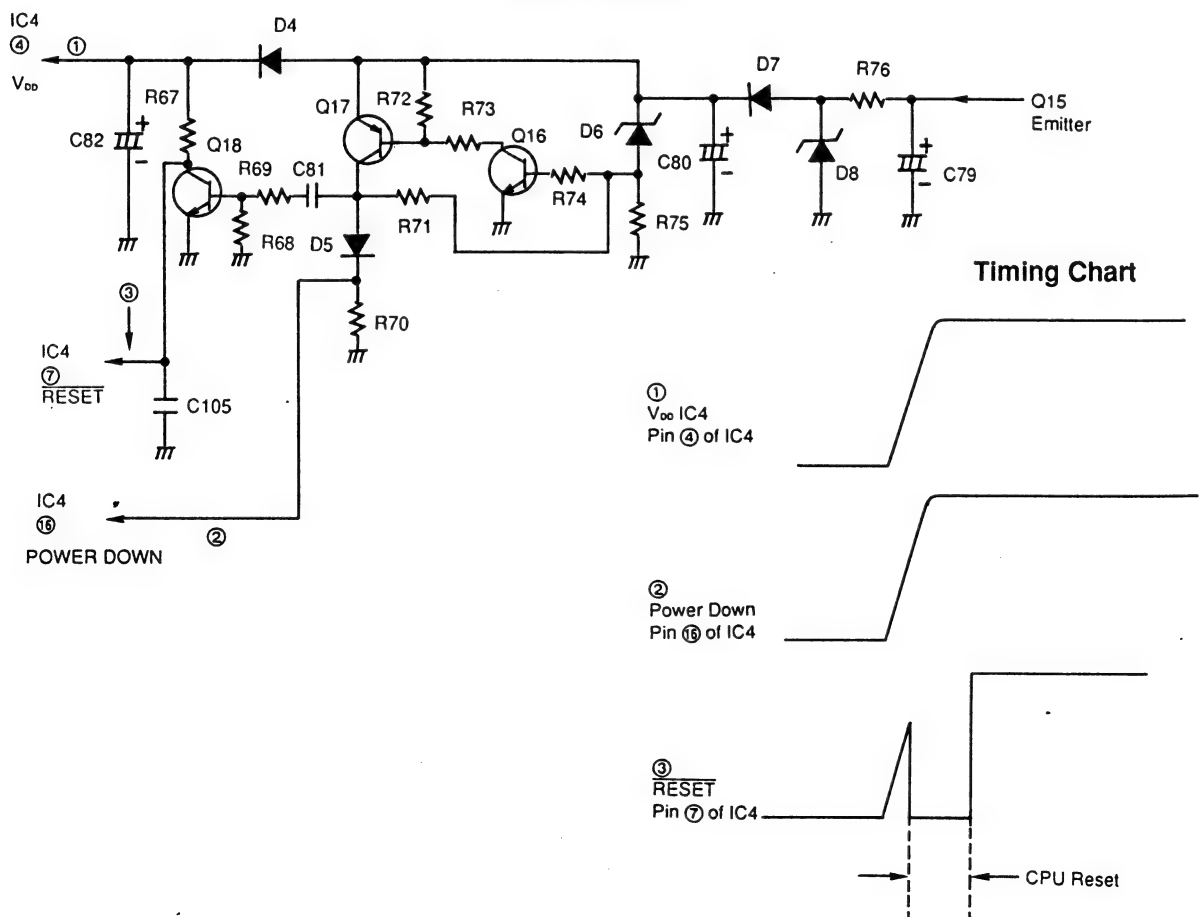


Fig. 31



## ■ CHARGE DETECT CIRCUIT

### Circuit operation:

#### ●CHARGE MODE

When charging the portable handset on the base unit, CH ID CODES are sent from the CONT terminal to the portable handset, and charging current is supplied to the portable handset from the battery charge contacts via R88, R78 on base unit:

When the collector output of Q19 on the portable handset is input to Pin 39 of IC4 (CPU) through D10 and D21 (CHARGE LED) light is on. When the (A) point on the portable handset is High level, Q105 on portable handset goes on and Pin 56 of IC101 (CPU) becomes Low. In this way the CPU on portable handset detects the fact that the battery is charged.

#### ●Set up of the portable handset

When charging the portable handset on the base unit, the data signal is sent from CONT terminal to portable handset. The Q20 switching is affected by Pin 31 of IC4, the sending data are CH data, ID code, tone or pulse mode data etc. The data signal is sent to Pin 42 of IC101 (CPU) via Q106 on portable handset.

While charging these data continue to be sent, the CPU of portable handset operates independent of whether power switch is turned ON or OFF, and these data are received by the CPU.

#### ●Quick charge

When pressing the quick charge button of base unit, Pin 33 of IC4 (CPU) in base unit changes from High to Low, quick charge LED lights, and quick charge DATA is sent from Pin 31, then portable handset receives the DATA at Pin 42 of IC101 (CPU). At this time, if battery of portable handset isn't full-charged situation, Pin 35 of IC101 in portable handset changes from Low to High, Q104 and Q102 switch ON to become quick charge mode. If portable handset is full-charged situation or reaches full-charged situation from quick charge situation, Pin 35 of IC101 becomes Low level, and portable handset sends DATA that tells it is full-charged situation with electric wave, therefore Pin 33 of IC4 in base unit flashes to go on and off quick charge LED.

If it becomes full-charged situation, Q104 and Q102 turn OFF, it changes from quick charge mode to normal charge mode. And if it continues more than about 10 hours, Pin 34 of IC101 changes from Low to High and it changes trickle mode to protect battery from overcharge.

Circuit Diagram

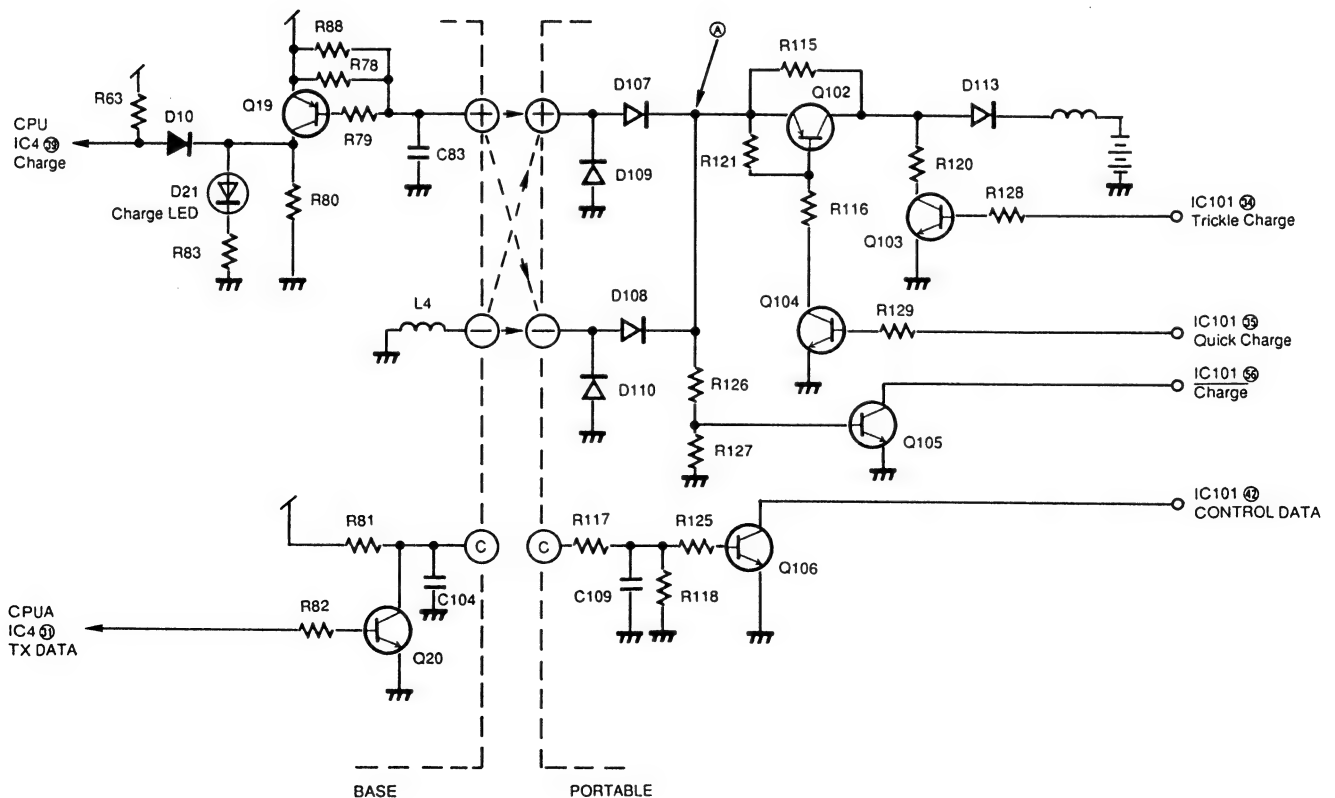


Fig. 32

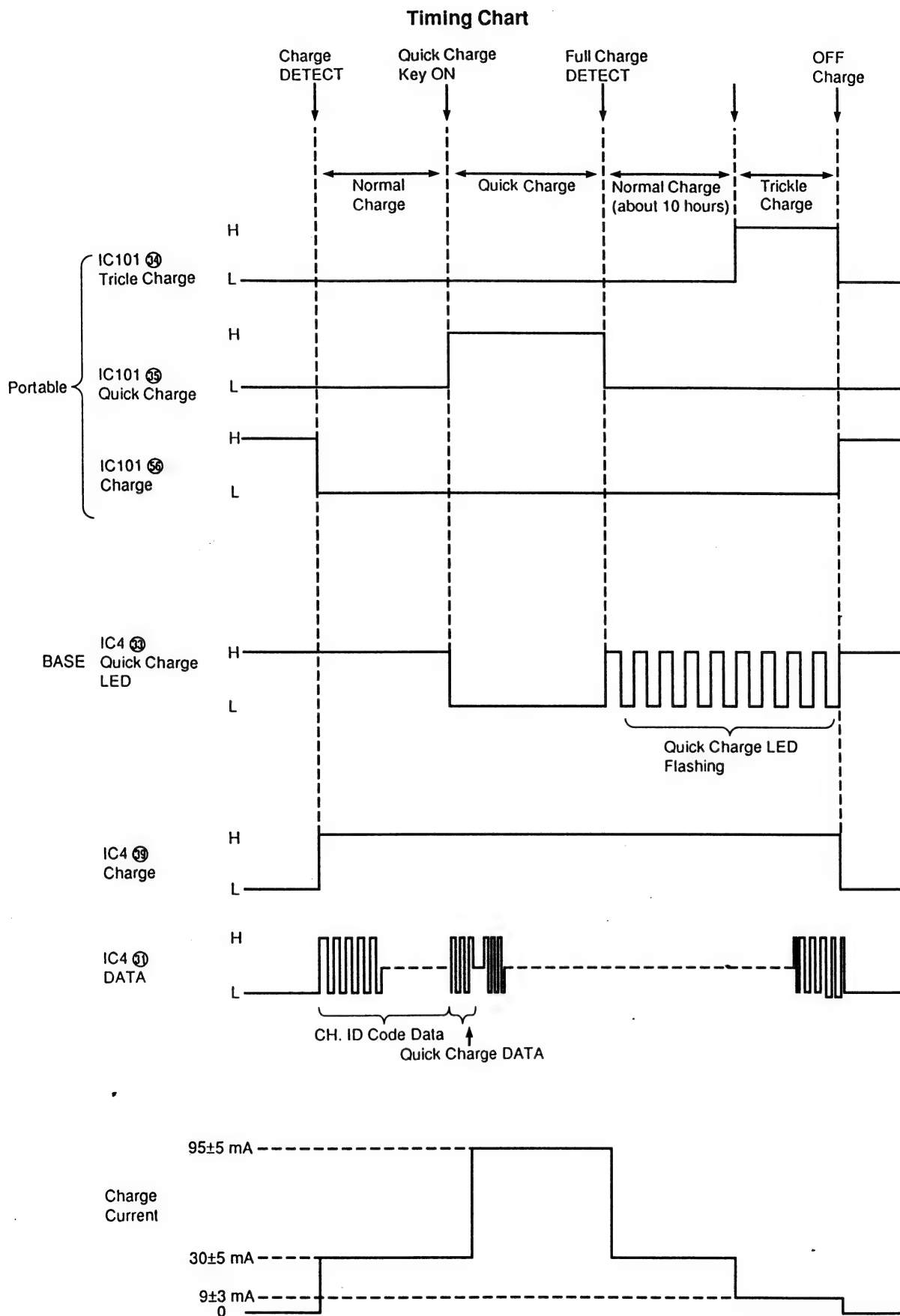


Fig. 33

MEMO

# NORMAL CIRCUIT OPERATION (KX-T3950H)

## ■ TELEPHONE LINE INTERFACE

### Circuit Operation:

#### ●ON HOOK

Q14 is open and connected as to cut the DC loop current and to cut the voice signal. The unit is consequently in an on-hook condition.

#### ●SPECIFICATIONS

In the on-hook state (idle), the current flows between the telephone line and the unit is as follows:

$T \rightarrow C62 \rightarrow R98 \rightarrow PC302 \rightarrow R$

The DC component is blocked by C62: thereby providing an on-hook condition.

The AC interface impedance is over 47 k $\Omega$ ; thus, satisfying the telephone company requirements.

## ■ TELEPHONE MODE OPERATION

When a ring signal enters from the Line

- 1) The ring detection circuit, i.e., the photocoupler PC302, begins to operate and its output is input to Pin 15 of IC4 (CPU).
- 2) To show the arrival of the ring signal to the portable handset, Pin 30 of IC4 enters into the transmit mode thus becoming a High and the ring data having the code set by Pin 31 of IC4 is sent to portable handset as a modulated output signal.
- 3) Upon receiving the ring data, and the portable handset is switched from standby to the talk mode, the base unit receives a carrier modulated by the data indicating a switch from standby to talk. This data is then demodulated at the base unit and passes through a data signal amplifier of IC1. This signal is then inputted to Pin 14 of IC4, activating Q13 via Pin 41 of IC4 which causes Q14 and PC303 to release the muting, and enable talk.

Circuit-making from the portable handset

- 1) When the operator of the portable handset presses the talk button, data is transmitted the base unit, this data is then demodulated by the base unit and passed through data signal amplifier of IC1 and enters Pin 14 of IC4.
- 2) When the codes coincide, Pin 41 of IC4 becomes a "High". At this time the transmit condition is enabled and the muting is cancelled via Q13, and the photocoupler PC303 is turned on.
- 3) Further, and IN USE signal is sent out from Pin 34 of IC4, thus dimly lighting the IN USE/INT'COM LED (D20).

Circuit Diagram

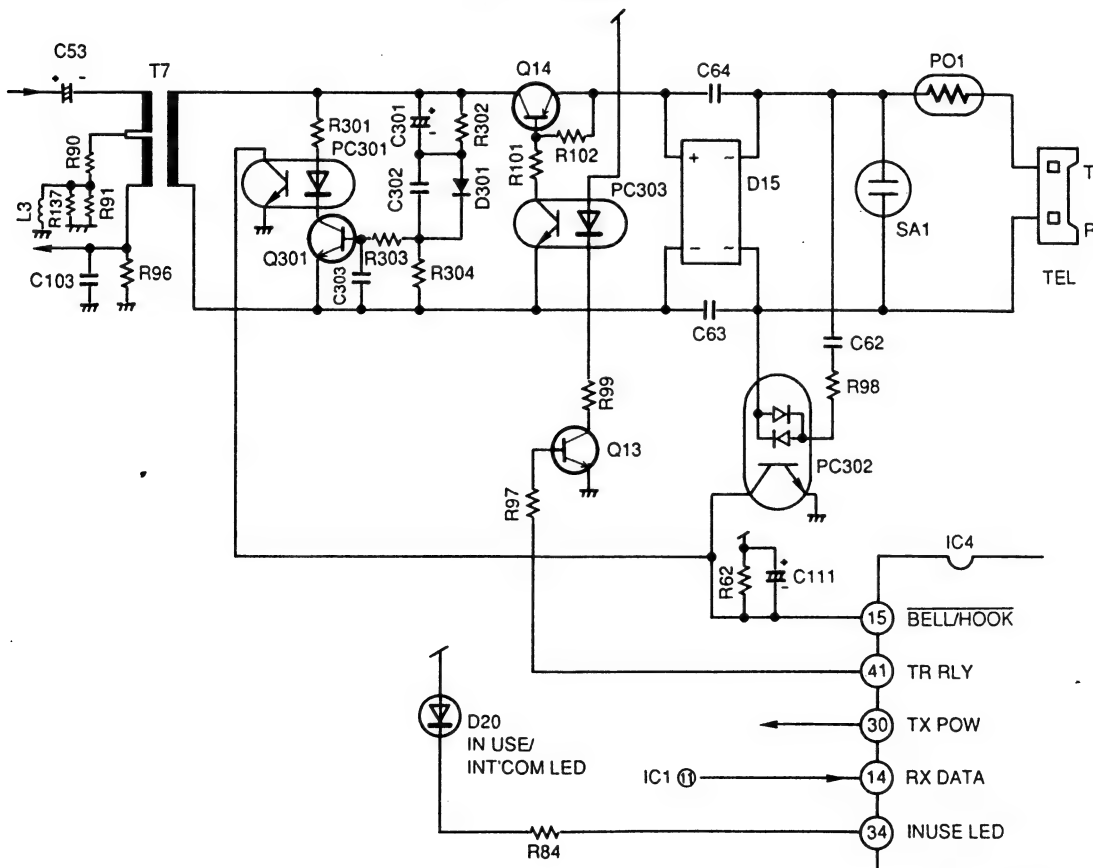




Fig. 34

## ■ CPU OPERATION

### 1. TEL MODE AND INTERCOM MODE

CPU Terminals Operation Mode	11, 12, 37, 38 CH DATA	17 L MUTE	20 SP MUTE	30 TX POW	31 TX DATA	40 BEEP	41 TR-RLY
STANDBY	L or H	H	H	L	H	L	L
TALK	FIXED	L	H	H	H	L	H
INTERCOM	FIXED	H	L	H	H	L	L
3950R→3950H Paging	FIXED	H	L	H	DATA OUTPUT		L
3950H→3950R Ring	FIXED	H	H	H	DATA	L	L
3950H→3950R Paging	FIXED	H	L	H	DATA		L
CHARGE	L or H	H	H	L	H	L	L
CH Changing (INT'COM)	L or H	H	H	L	—	L	L
CH Changing (TALK)	L or H	H	H	L	—	L	H

### 2. TIMING OF IC4 (CPU) OUTPUT PORT WITH THE BASE UNIT IN PAGE/INT'COM MODE

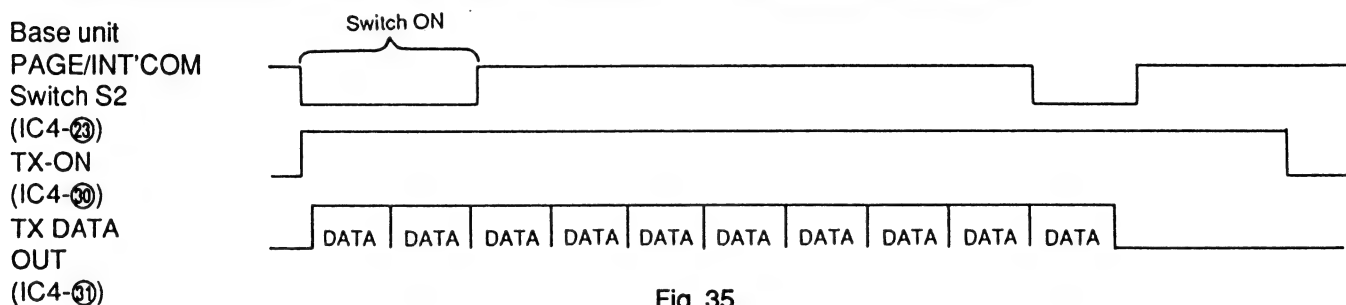


Fig. 35

### 3. WHEN PRESSING THE TALK SWITCH OF THE PORTABLE HANDSET

### 4. WHEN SETTING THE ON/OFF SWITCH OF THE PORTABLE HANDSET TO OFF

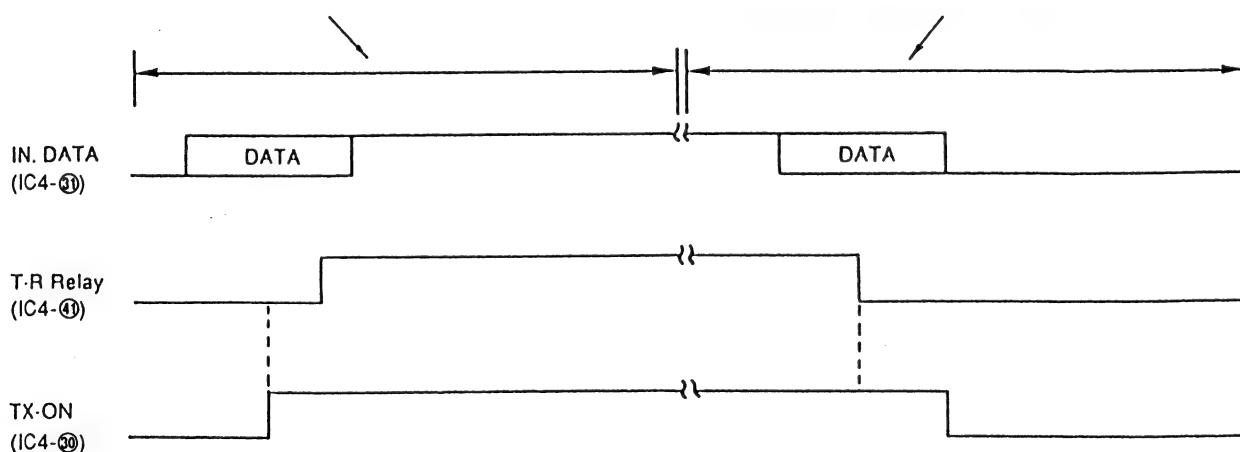
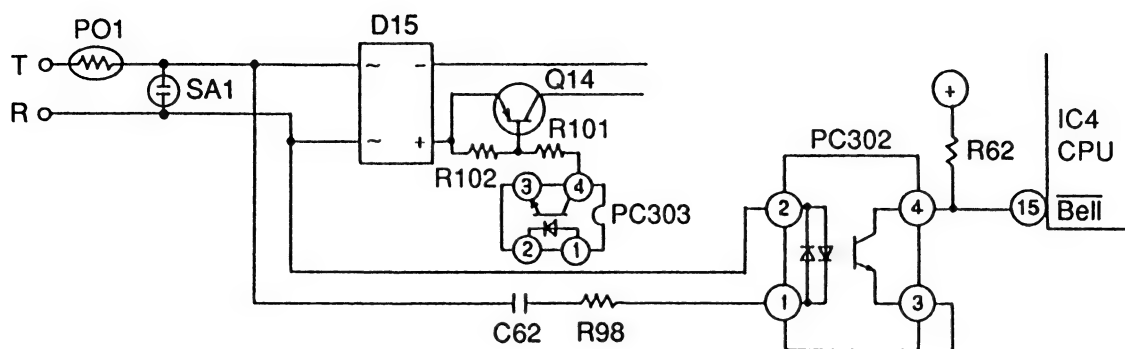


Fig. 36

## 5. RESONANCE PREVENTION CIRCUIT

### Circuit Diagram



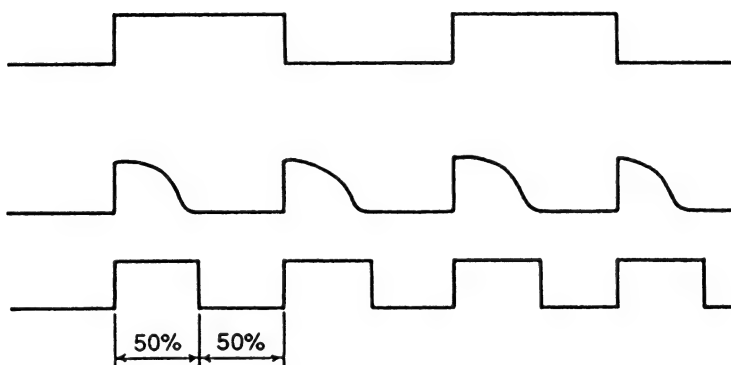
**Fig. 37**

## Ring Signal

●T-R

●PC302-②

●PC302-④



**Make/break ratio when dialing with the Portable handset:**

40%: 60%

High/low ratio upon ring signal:

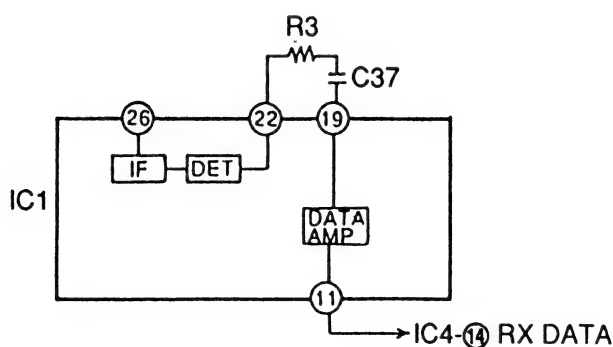
50%; 50%

Therefore, if the low/high ratio is greater than 45% at IC4-15 (CPU), it is judged as a ring signal. See Fig. 37.

## 6. EXPLANATION OF THE RECEIVE CIRCUIT

### 6-1. Signal Flow

### Circuit Diagram



**Fig. 38**

In areas where the transmission power from the portable handset is extremely weak, noise is superimposed on the data and the chance of an error can become extremely great upon reception of the data. To help prevent this, the above circuit is used.

**Fig. 39**

KX-T3950 KX-T3950  
BLOCK DIAGRAM (KX-T3950R)

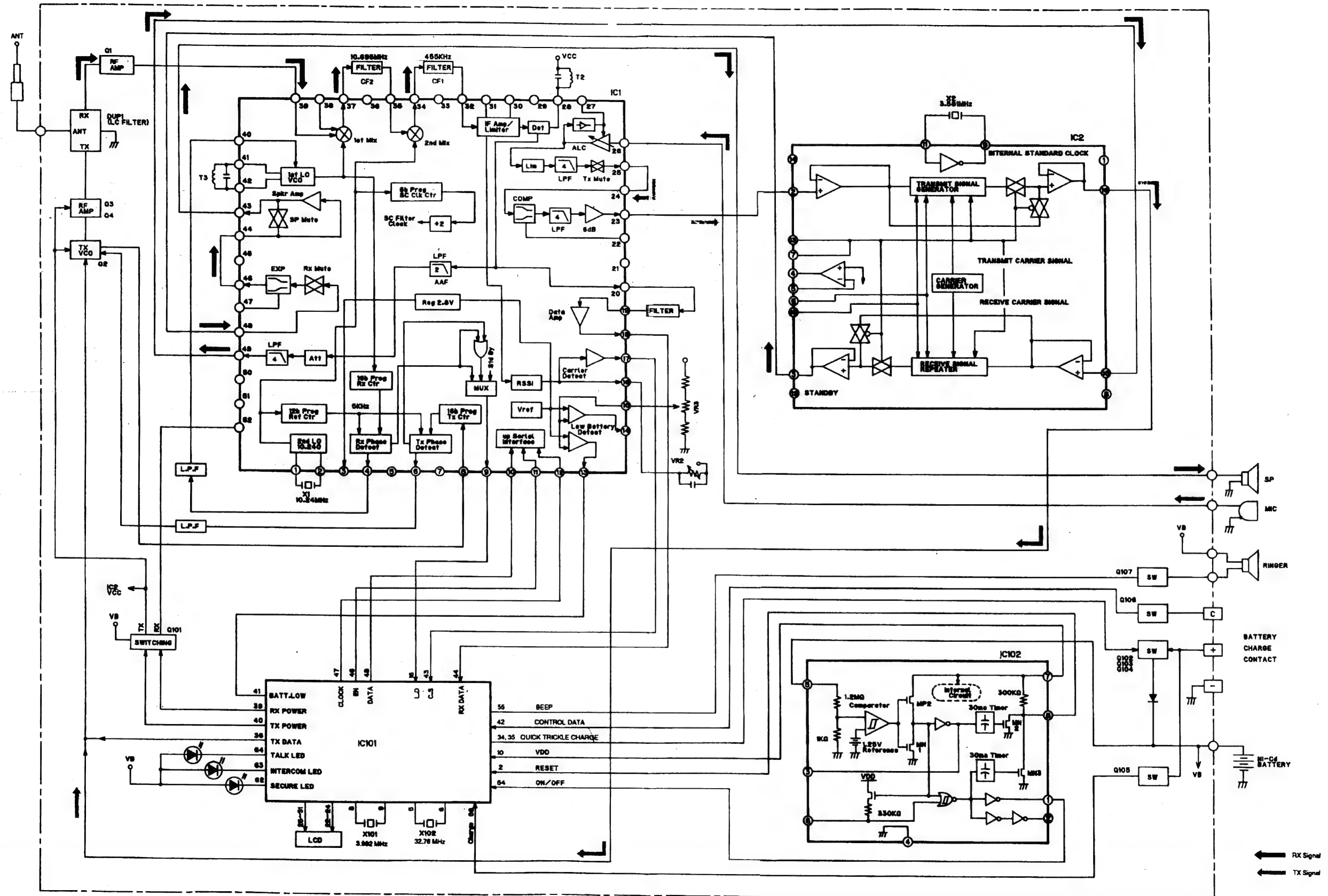


Fig. 40



## NEW CIRCUIT OPERATION (KX-T3950R)

### ■ RECEIVER RF IF CIRCUIT

#### Circuit Operation:

The signal of 46 MHz band (46.61 MHz~46.97 MHz) which is input from ANT is filtered by DUP1, passes through filtered Amp of 46 MHz band at T1 and Q1, and is input to Pin 38 and Pin 39 of IC1.

The RX VCO which oscillates at T3 and IC1 is locked to 1st Local frequency by PLL inside IC1. (PLL is controlled by serial data output from Pin 46, 47 and 48 of IC101.)

An input signal from Pin 38 and 39 of IC1 and 1st Local frequency output from RX VCO are mixed inside IC1, pass through CF2, and 1st IF frequency of 10.695 MHz is generated.

Further, 10.240 MHz and 10.695 MHz oscillated at X1 pass through MIXER inside IC1 and are filtered at CF1 and output 2nd IF 455 kHz.

Circuit Diagram

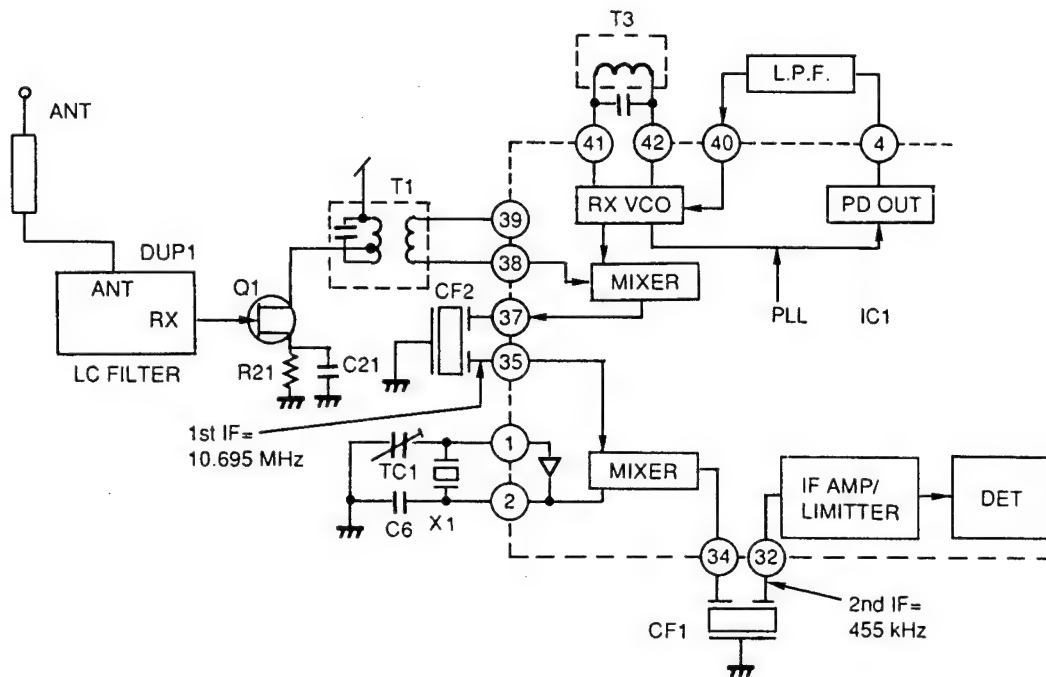


Fig. 41

### ■ RECEIVER SIGNAL CIRCUIT

#### Circuit Operation:

1. ATT, RX MUTE, MIC MUTE, SP MUTE and PLL CONTROL (CH, REFERENCE, COUNTER) are all controlled by serial data output from Pins 46, 47 and 48 of IC101.
2. A detected signal passes through L.P.F (fc=4 kHz) inside IC1 and is output to Pin 49.
3. Next, it passes through C58 and is input to Pin 15 of IC2. In case of SECURE ON, the inverted frequency of input frequency is output from Pin 3 of IC2 by comparing with the standard frequency 3.2 kHz generated by oscillator of 3.581 MHz. (Ex. When f=1 kHz is input, f=2.30 kHz is output.)  
In case of SECURE OFF, an input signal to Pin 15 of IC2 is output from Pin 3 as it is.
4. Next, it is input to Pin 48 of IC1, passes through EXPANDER→SP AMP, and is output to speaker.

Circuit Diagram

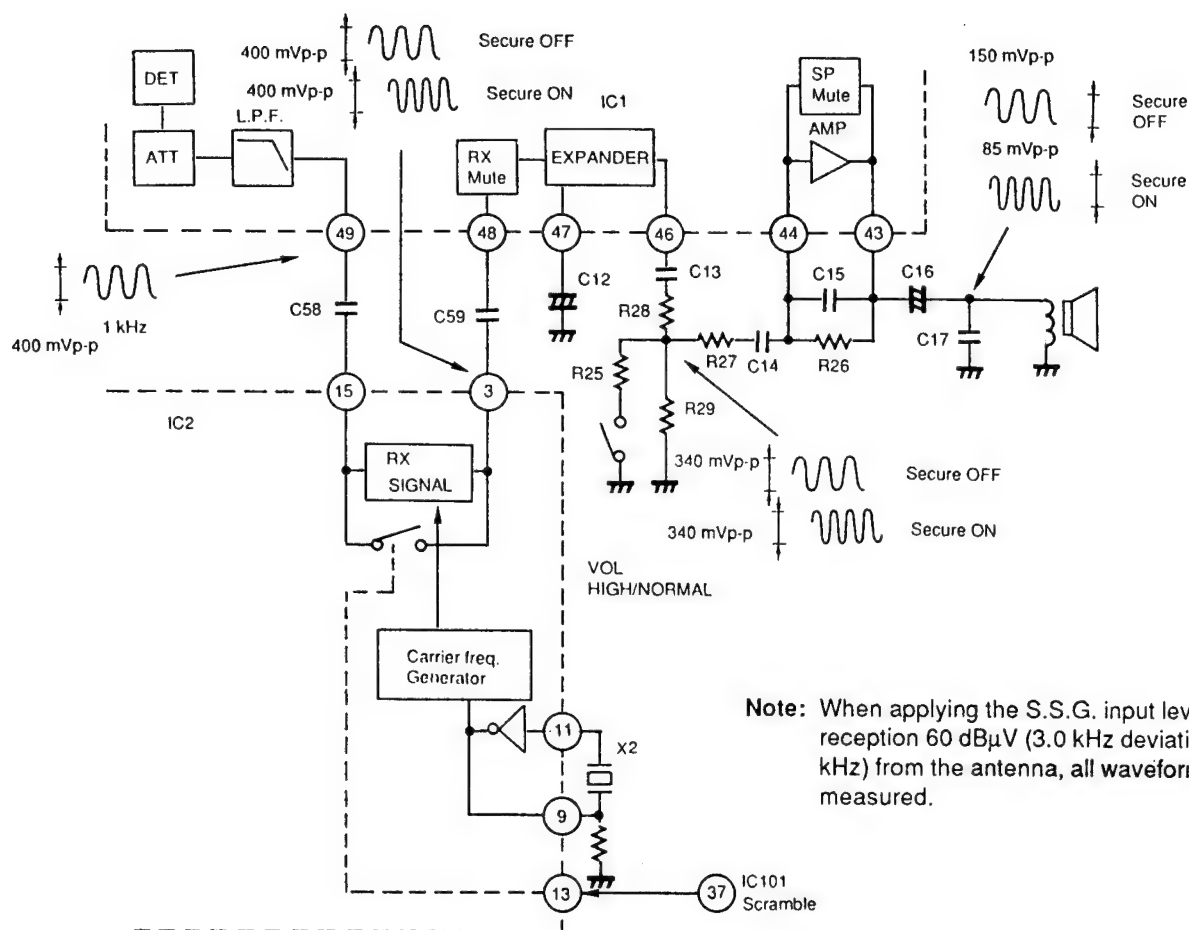


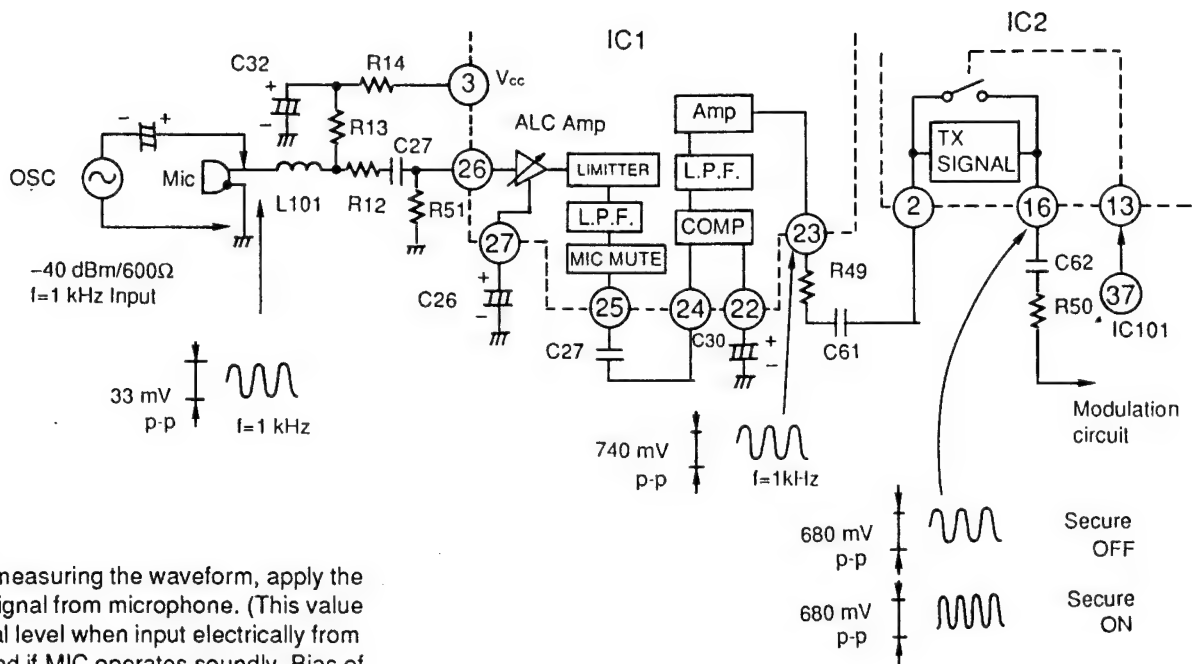
Fig. 42

## TRANSMITTER SIGNAL CIRCUIT

### Circuit Operation:

1. Input signal from MIC is input to Pin 26 of IC1, passes through ACL AMP Limiter and L.P.F. (fc=4 kHz), and is output to Pin 25.
2. Next, it passes through C27 and is input to Pin 24 of IC1, then passes through COMPRESSOR and L.P.F. (fc=4 kHz), and is output to Pin 23.
3. Next, it is input to Pin 2 of IC2. In case of SECURE ON, the inverted frequency of input frequency is output from Pin 16 of IC2 by comparing with the standard frequency 3.2 kHz generated by oscillator of 3.581 MHz. (Ex. When f=1 kHz is input, f=2.30 kHz is output.)
4. An output signal from Pin 16 passes through C62 and R50, and is input to modulator circuit.

Circuit Diagram



**Note:**

When measuring the waveform, apply the OSC Signal from microphone. (This value is signal level when input electrically from MIC, and if MIC operates soundly, Bias of DC voltage from R13 and R14 will be necessary.)

Fig. 43

## RECEIVER DATA CONTROL CIRCUIT

**Circuit Operation:**

The received signal that is output from Pin 20 of IC1 passes through a low pass filter and is input to Pin 19 of IC1 where the waveform is adjusted. The resulting signal is output from Pin 18 and input to Pin 44 of CPU.

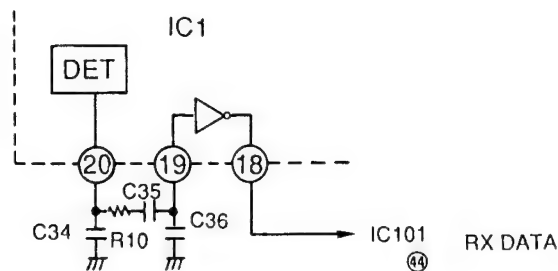


Fig. 44

## BATTERY DETECTOR CIRCUIT

**Circuit Operation:**

When the battery voltage goes down and the rest of operating time becomes short, the residuary battery voltage will be shown by flashing on the LCD, and the alarm will sound every 15 seconds.

## NORMAL CIRCUIT OPERATION (KX-T3950R)

## ■ CPU OPERATION

CPU Terminals Operation Mode	36 TX DATA	39 RX POW	40 TX POW	55 BEEP OUT	33 BEEP	63 INT'COM LED	64 TALK LED
STANDBY	L	L	H	H	H	H	H
TALK	L	L	L	H	H	H	L
INTERCOM	L	L	L	H	H	L	H
3950R→3950H Paging	DATA	L	L	⏏	H	FLASHING	H
3950H→3950R Ring	—	L	L	⏏	L	H	FLASHING
3950H→3950R Paging	—	L	L	⏏	L	FLASHING	H
CHARGE	L	L	H	H	H	H	H
During (INTCOM)	—	L	L	H	H	L	H
During (TALK)	—	L	L	H	H	H	L
3950R PULSE DIAL	DATA	L	L	—	H	H	FLASHING
3950R TONE DIAL	DATA	L	L	—	H	H	L
3950R OFF MODE	L	H	—	H	L	H	H

## ■ RESET CIRCUIT POWER ON/OFF CIRCUIT

### Reset circuit

The reset signal is input to Pin 2 of the CPU by the below circuit.

Once the reset signal is input, the CPU starts to operate from the memory hold mode.

(A) The reset signal will be output if S1 goes On when voltage of battery is higher than 2.8 V.

### Circuit Diagram

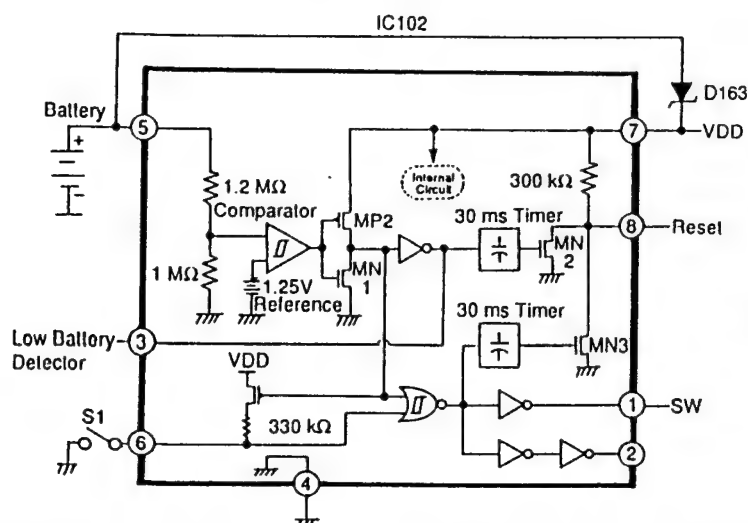
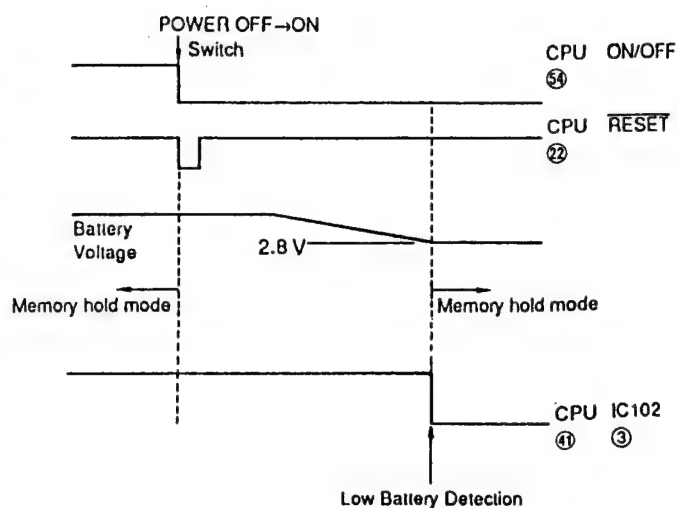


Fig. 45

### Timing Chart



**Fig. 46**

# RF SPECIFICATION

## BASE UNIT (KX-T3950H)

Item	Value	Refer to —.	Remarks
TX Frequency	46.970 MHz $\pm$ 200 Hz	Page 9 (C)	at CH10
TX Power	130 mV $\pm$ 10 mV	Page 9 (D)	
TX Modulation factor	2.0 kHz $\sim$ 3.0 kHz	—	
TX Modulation Distortion	Less than 8%	—	
TX Max. Modulation factor	4.0 kHz $\sim$ 7.5 kHz	—	
Data Modulation factor	4.0 kHz $\sim$ 7.0 kHz	—	

## Portable Handset (KX-T3950R)

Item	Value	Refer to —.	Remarks
Practical Sensitivity	Less than 9 dB $\mu$ V	—	at CH5
Carrier Sensitivity	Less than 18 dB $\mu$ V	Page 18 (G)	Test Mode Standby H $\rightarrow$ L at CH5
TX Frequency	49.970 MHz $\pm$ 100 Hz	Page 17 (D)	at CH10
TX Output	250 mV $\sim$ 500 mV	Page 17 (E)	at CH10 (Antenna soldering point 50 $\Omega$ Load)
Data Modulation factor	5.0 kHz/dev $\sim$ 8.0 kHz/dev	Page 18 (H)	at CH10
MIC Modulation factor	2.4 kHz/dev $\sim$ 3.6 kHz/dev	—	at CH10 (Set $-40$ dB at 600 $\Omega$ termination. When it is inputted to MIC, remove the 600 $\Omega$ .)

## HOW TO CHECK THE PORTABLE HANDSET SPEAKER

1. Prepare the digital voltmeter, and set the selector knob to ohmmeter.
2. Put the probes at the speaker terminals as shown in Fig. 47.
- 3.

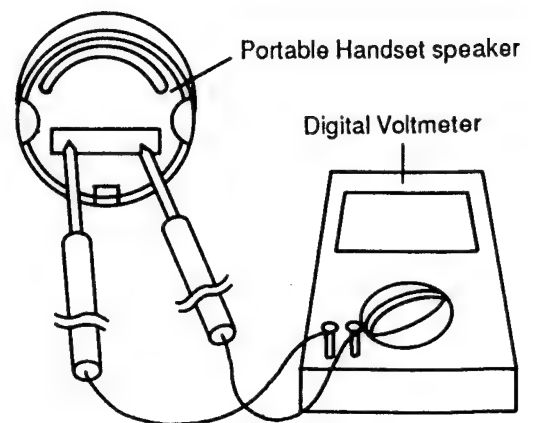
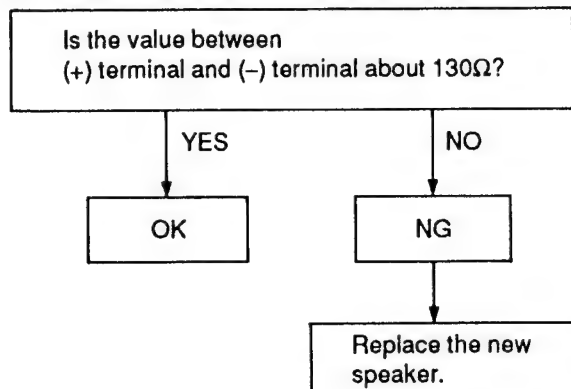


Fig. 47

## TROUBLESHOOTING GUIDE

Symptom	Refer to page —.	Unit for repair	
The base unit does not receive a call from portable handset.	9, 10	Base Unit	
The base unit does not transmit, and the transmit frequency is slipped.			
The transmit frequency is slipped.			
The transmit output is low, and the arrival distance is shorted between base unit and portable handset.			
The reception sensitivity of base unit is wrong, the noise is occurred.			
The base unit does not ring from the speaker.			49
The base unit does not seize the telephone line.			49
The charge indicator does not light.			49
The IN USE/Intercom indicator does not flash.			49
The beep is not heard from the portable handset.			50
The portable handset does not become the intercom mode.	50		
The movement of Battery Low indicator is wrong.	17, 18	Portable Handset	
The base unit does not receive a call from portable handset.			
The base unit does not transmit, and the transmit frequency is slipped.			
The transmit frequency is slipped.			
The transmit output is low, and the arrival distance is shorted between base unit and portable handset.			
The reception sensitivity of base unit is wrong, the noise is occurred.			
Does not link between base unit and portable handset.			
The all indicates of LCD are not shown for about 1 second.			52
After LCD is off, the portable handset does not become battery save mode.			52
The page/intercom indicator does not flash.			52
The unit does not become the intercom mode.	53		
The TALK indicator does not flash.	53		

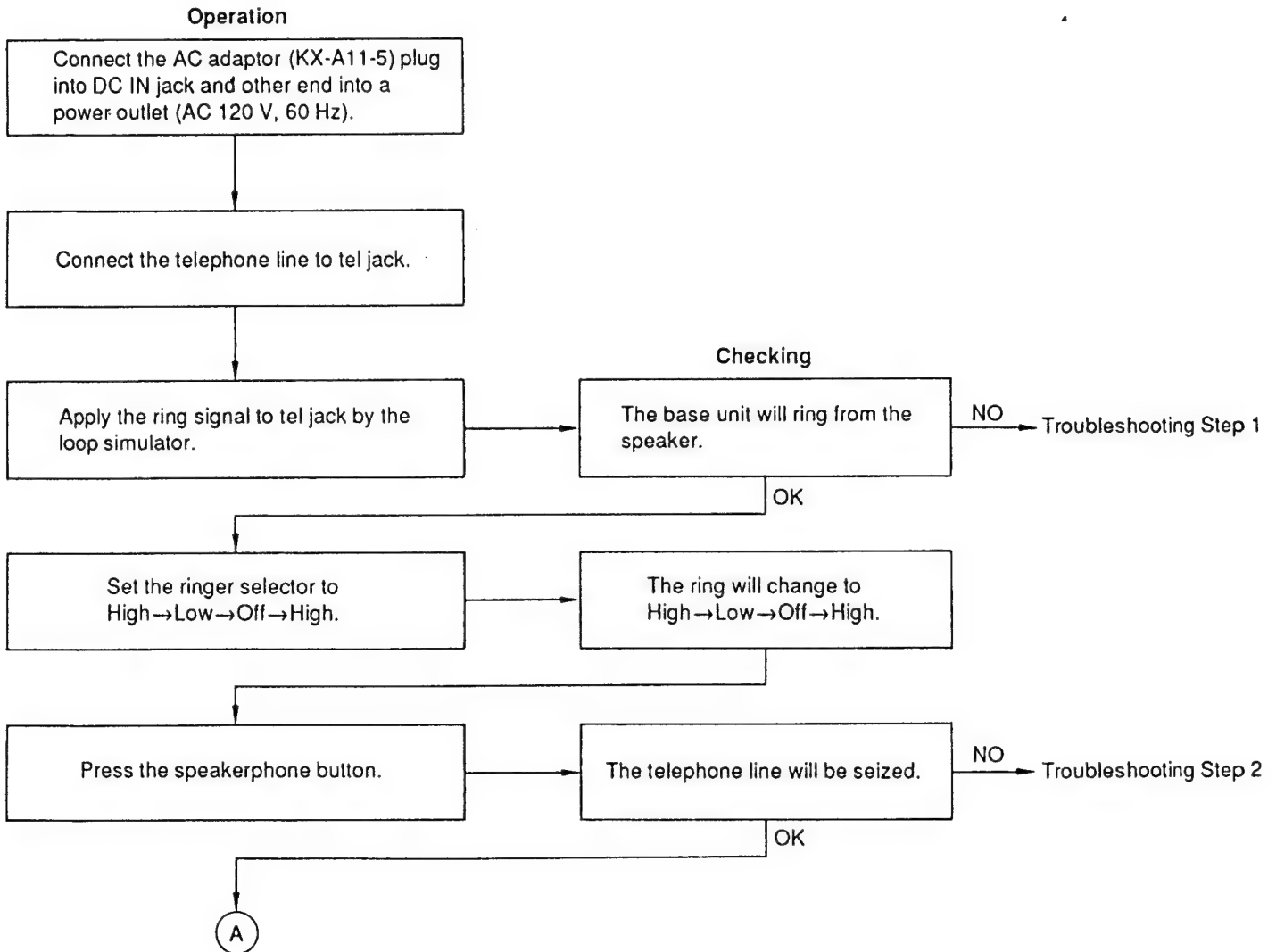
# TROUBLESHOOTING GUIDE (KX-T3950H)

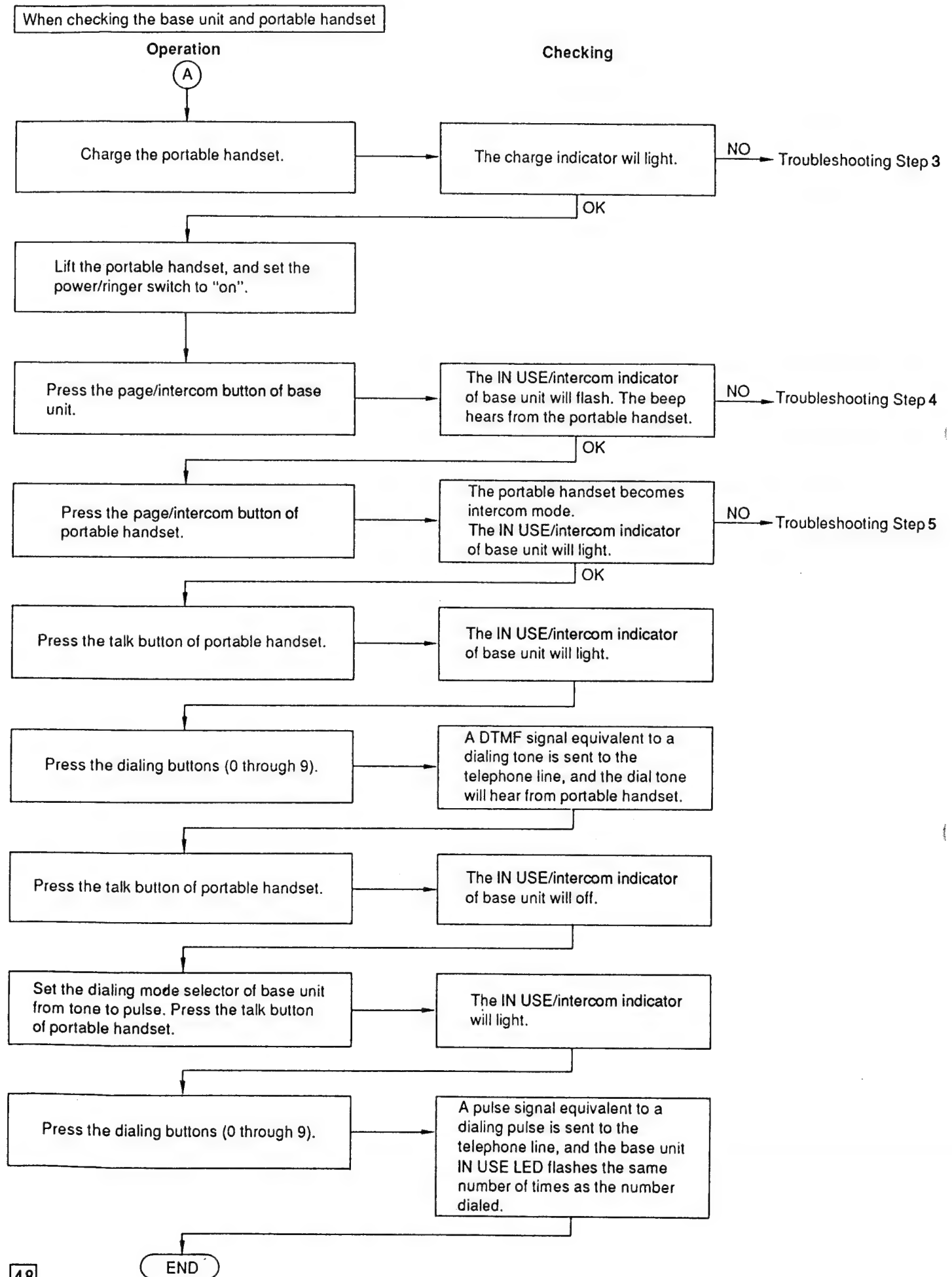
## Base Unit Condition:

Set the dialing mode selector to "Tone".

When checking the base unit only

Check the base unit as shown by following below flow chart.

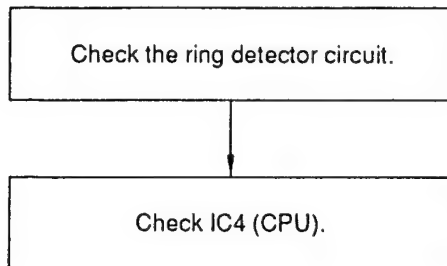




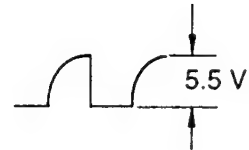


**Troubleshooting Step 1:**

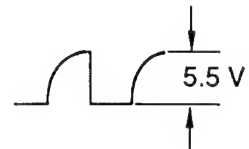
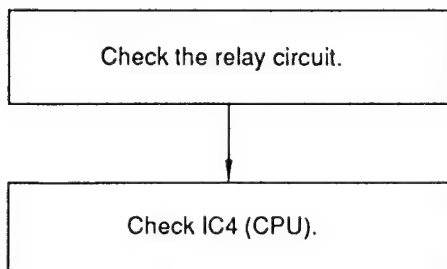
The base unit does not ring from the speaker.



**Check Point**  
① Pin 4 of PC302 output voltage.

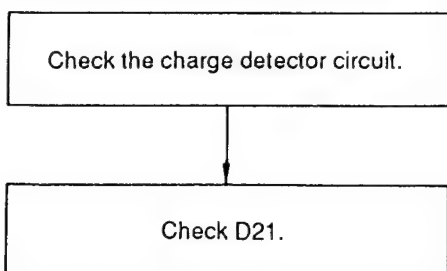


**Check Point**  
① Pin 15 of IC4 ring input voltage.

**Troubleshooting Step 2:** The base unit does not seize the telephone line.

**Check Point**  
① Is the collector of Q13 at a low logic level?

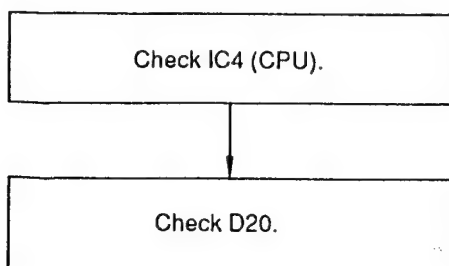
**Check Point**  
① Is the pin 31 of IC4 at a high logic level?

**Troubleshooting Step 3:** The charge indicator does not light.

**Check Point**  
① Is the emitter of Q19 (charge detector transistor) 6 V?

**Troubleshooting Step 4:**

1) The IN USE/intercom Indicator does not flash.



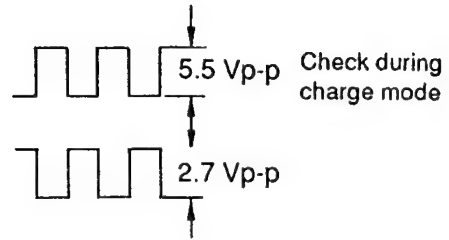
**Check Point**  
① Is the pin 34 of IC4 (IN USE/Intercom output) at a low logic level?

## 2) The beep is not heard from the portable handset.

Check the data transmission during charge mode.

## Check Points

① Pin 31 of IC4 data output voltage



② Collector of Q20 output voltage

Check the modulation circuit (D3).

Check the oscillation circuit

## Check Points

① Is the base of Q4 (TX VCO) 4 V?

② Is the pin 15 of IC3 (PLL) 3.2 V?

③ Is the pins 11, 37, 38 of IC4 (PLL control)?

Check the transmitter amplifier.

## Check Point

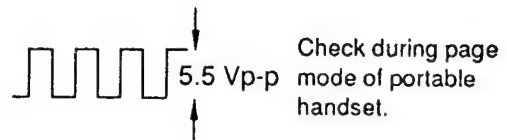
① Is the base of Q2 (Final power amplifier) 2 V?

**Troubleshooting Step 5:** The portable handset does not become the intercom mode.

Check the receiver circuit.

## Check Point

Pin 11 of IC1  
RX data output voltage



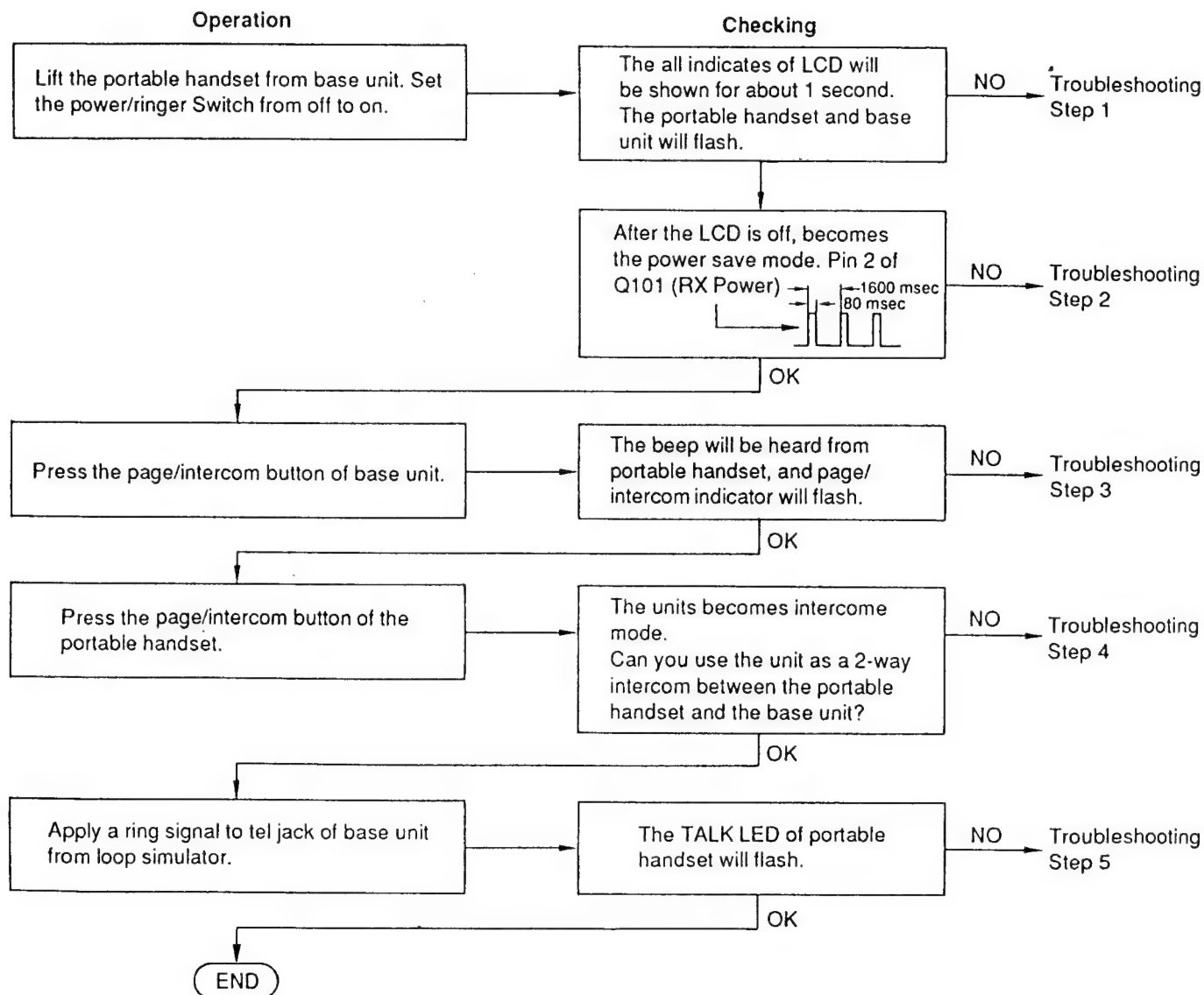
# TROUBLESHOOTING GUIDE (KX-T3950R)

Use the right base unit for this troubleshooting.  
Charge the battery of the portable handset by the base unit.

## Base Unit Condition:

1. Connect the AC Adaptor (KX-A11-5) plug into DC IN jack and the other end into a power outlet (AC 120 V, 60 Hz).
2. Connect the loop simulator (DC 48 V) to tel jack.

Check the portable handset as shown by following below flow chart.



**Troubleshooting Step 1:** The all indicates of LCD are not shown for about 1 second.

Check the reset circuit. (Refer to page 44.)

**Check Points:**

- (1) Check the rechargeable battery (KX-A36A) L1 and lead wire (W1).
- (2) Check the IC101 (CPU) level when setting the power/ringer switch from off to on.

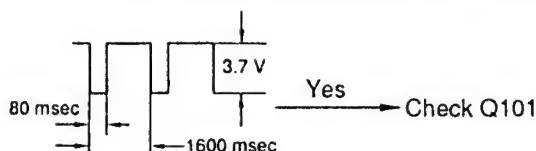
IC101 Pin No.	Power/ringer switch	
	off	on
Pin 56	H	H
Pin 53	H	H
Pin 10	H	H
Pin 54	H	L
Pin 2	H	Reset Pulse 30 ms
Pins 8, 9 (X101)	—	Oscillation Start (3.992 MHz)
Pins 5, 6 (X102)	—	Oscillation Start (32.76 MHz)

- (3) After setting the power/ringer switch from off to on, the LCD indicator does not off.

Check the any buttons whether it keep press.

**Troubleshooting Step 2:** After LCD is off, the portable handset does not become battery save mode.**Check point**

- (1) Pin 39 of IC101  
RX power output voltage

**Troubleshooting Step 3:** The page/intercom indicator does not flash.**Check Points**

- (1) After pressing the page/intercom button of base unit; Pin 13 of IC101 squelch output voltage
 

OK

↓

(A)

NO

↓

(B)

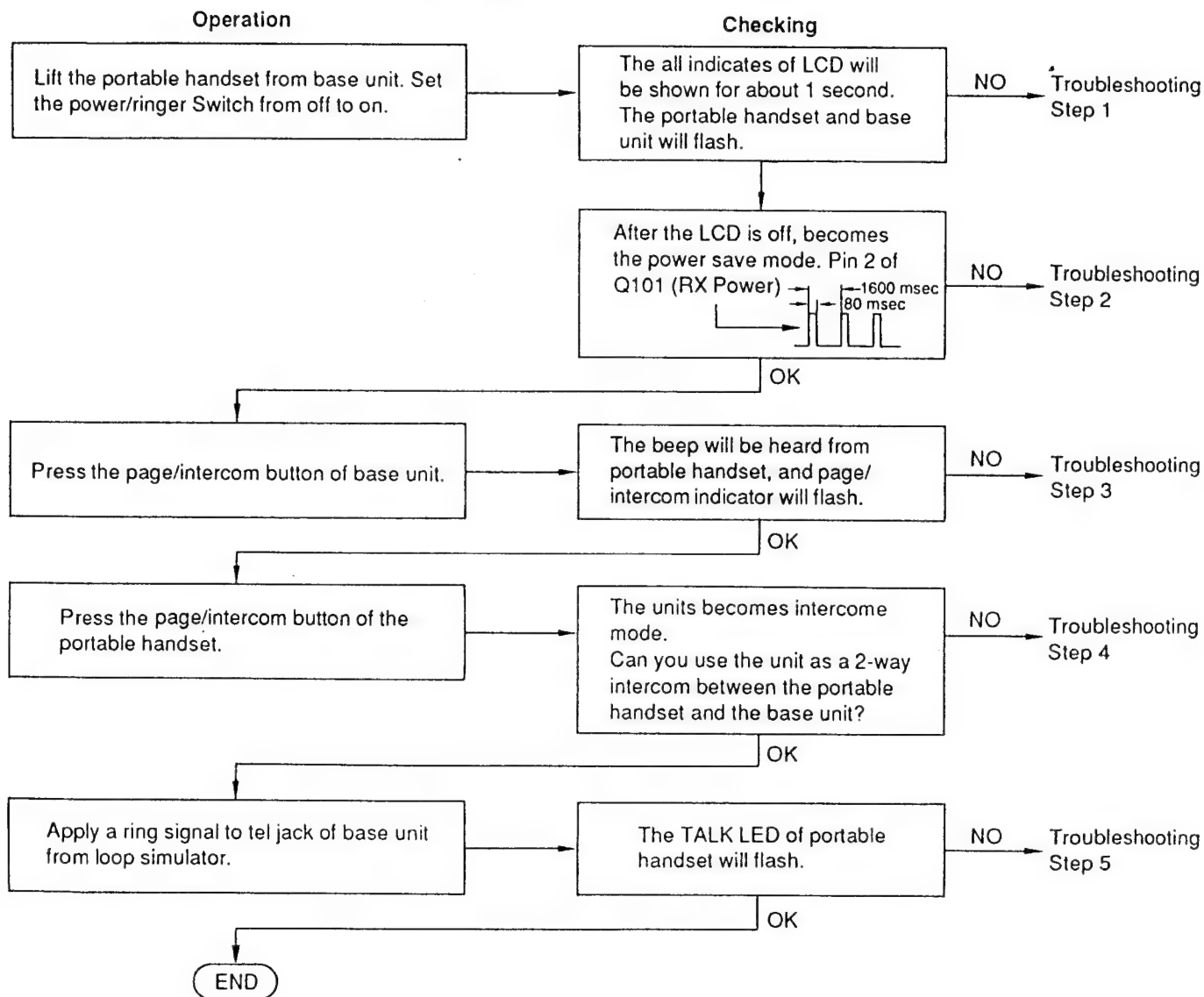
# TROUBLESHOOTING GUIDE (KX-T3950R)

Use the right base unit for this troubleshooting.  
Charge the battery of the portable handset by the base unit.

## Base Unit Condition:

1. Connect the AC Adaptor (KX-A11-5) plug into DC IN jack and the other end into a power outlet (AC 120 V, 60 Hz).
2. Connect the loop simulator (DC 48 V) to tel jack.

Check the portable handset as shown by following below flow chart.



**Troubleshooting Step 1:** The all indicates of LCD are not shown for about 1 second.

Check the reset circuit. (Refer to page 44.)

**Check Points:**

- (1) Check the rechargeable battery (KX-A36A) L1 and lead wire (W1).
- (2) Check the IC101 (CPU) level when setting the power/ringer switch from off to on.

IC101 Pin No.	Power/ringer switch	off	on
Pin 56		H	H
Pin 53		H	H
Pin 10		H	H
Pin 54		H	L
Pin 2		H	Reset Pulse 30 ms
Pins 8, 9 (X101)		—	Oscillation Start (3.992 MHz)
Pins 5, 6 (X102)		—	Oscillation Start (32.76 MHz)

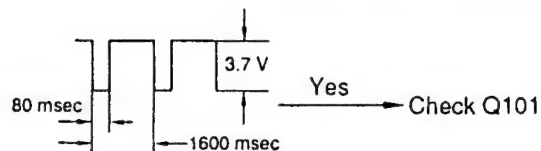
- (3) After setting the power/ringer switch from off to on, the LCD indicator does not off.

Check the any buttons whether it keep press.

**Troubleshooting Step 2:** After LCD is off, the portable handset does not become battery save mode.

**Check point**

- (1) Pin 39 of IC101  
RX power output voltage



**Troubleshooting Step 3:** The page/intercom indicator does not flash.

**Check Points**

- (1) After pressing the page/intercom button of base unit; Pin 13 of IC101 squelch output voltage
 

(Low level)

OK

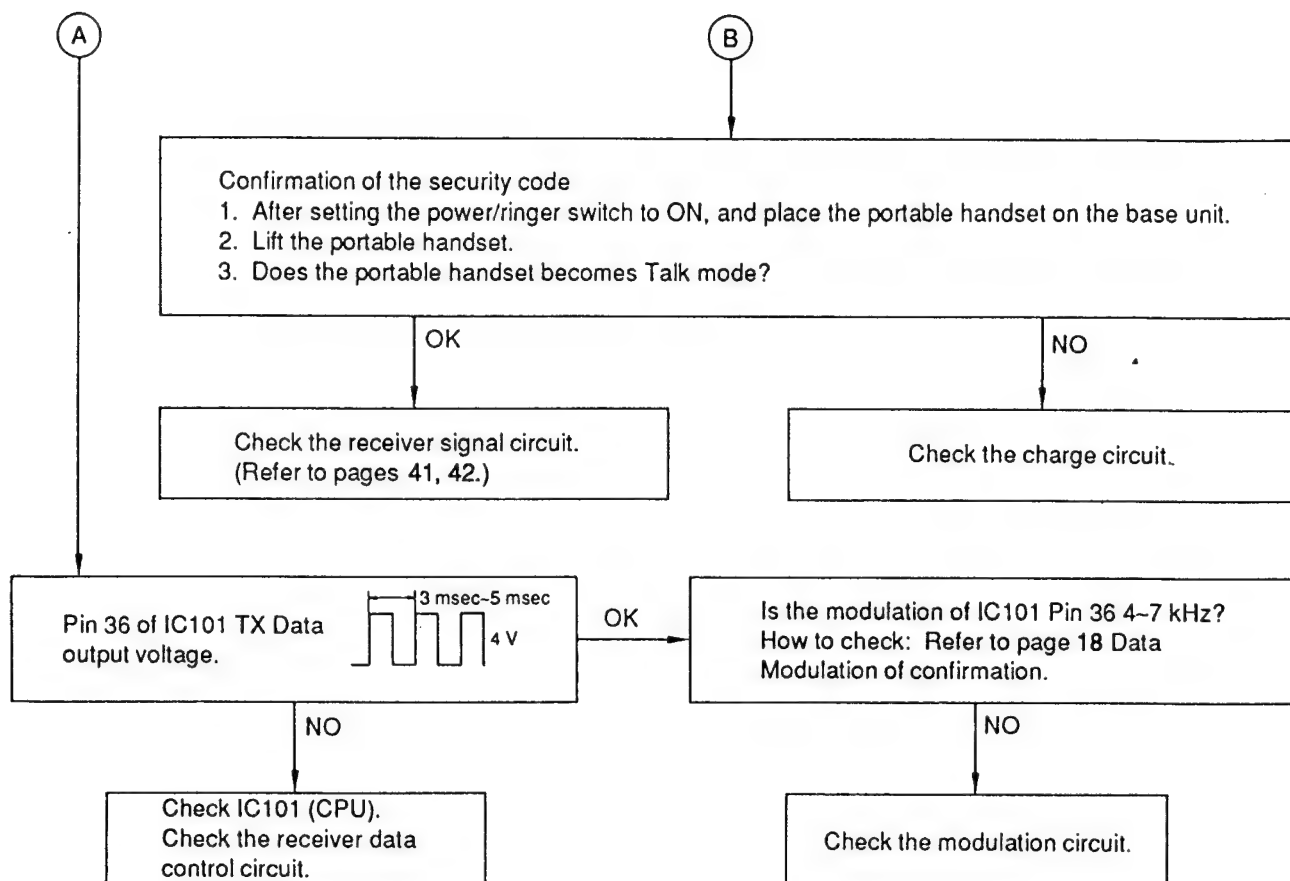
↓

(A)

NO

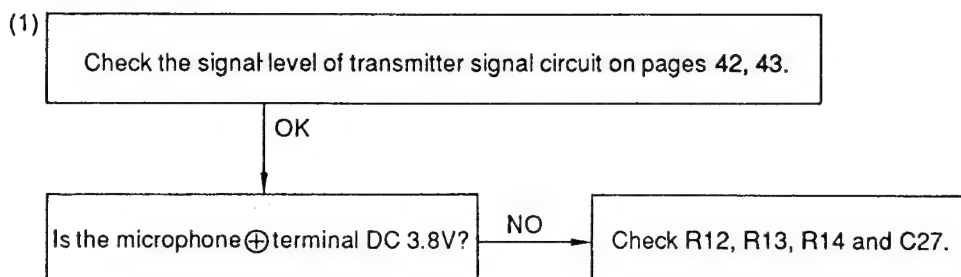
↓

(B)



**Troubleshooting Step 4:** The unit does not become the intercom mode.

**Check Points**



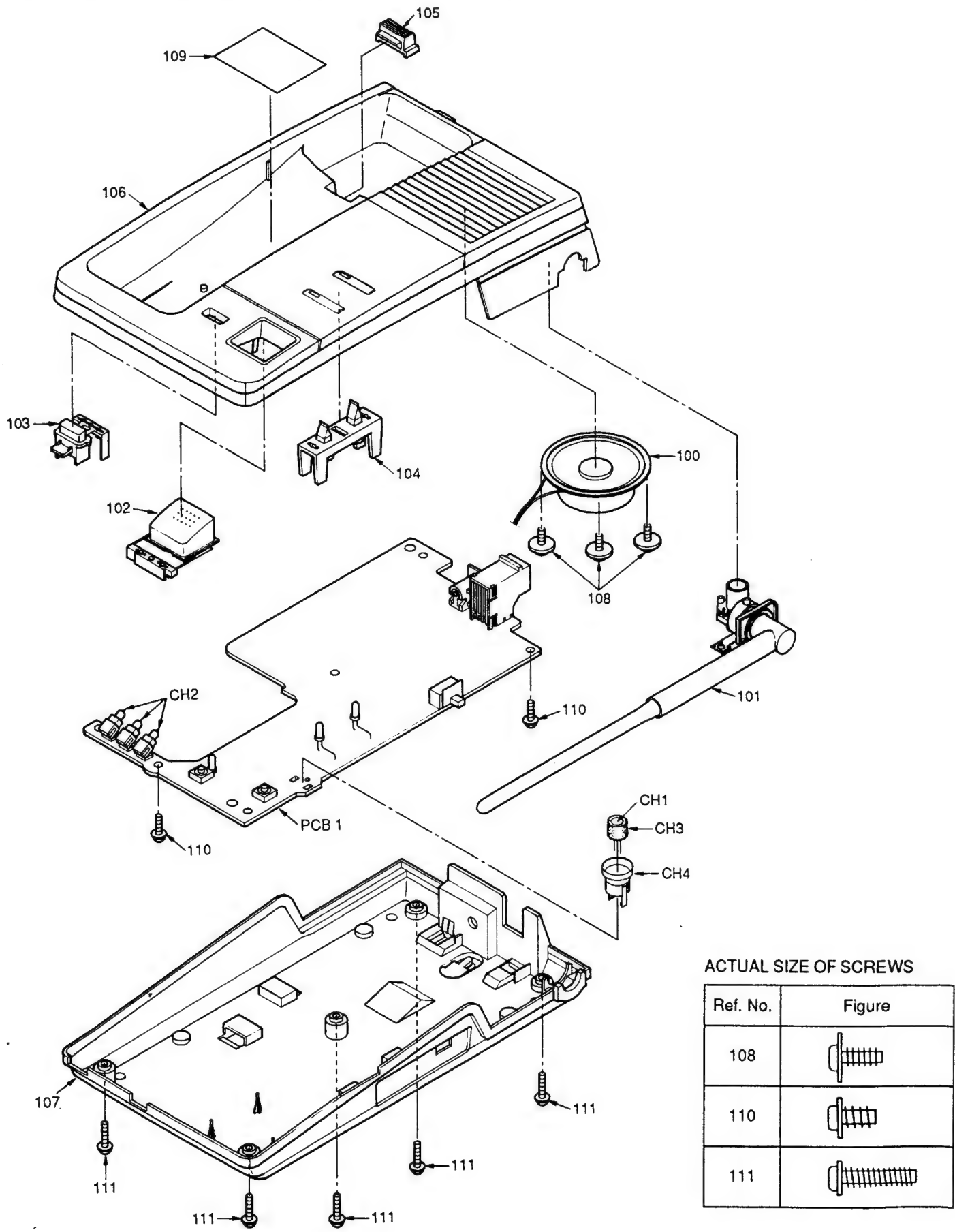
(2) Check the signal level of receiver signal circuit on pages 41, 42.

**Troubleshooting Step 5:** The TALK indicator does not flash (Check the data reception).

**Check Point**

(1) Check the signal level of receiver data control circuit on page 43.

CABINET AND ELECTRICAL PARTS LOCATION (KX-T3950H)



ACTUAL SIZE OF SCREWS

Ref. No.	Figure
108	
110	
111	

Fig. 48



# CABINET AND ELECTRICAL PARTS LOCATION (KX-T3950R)

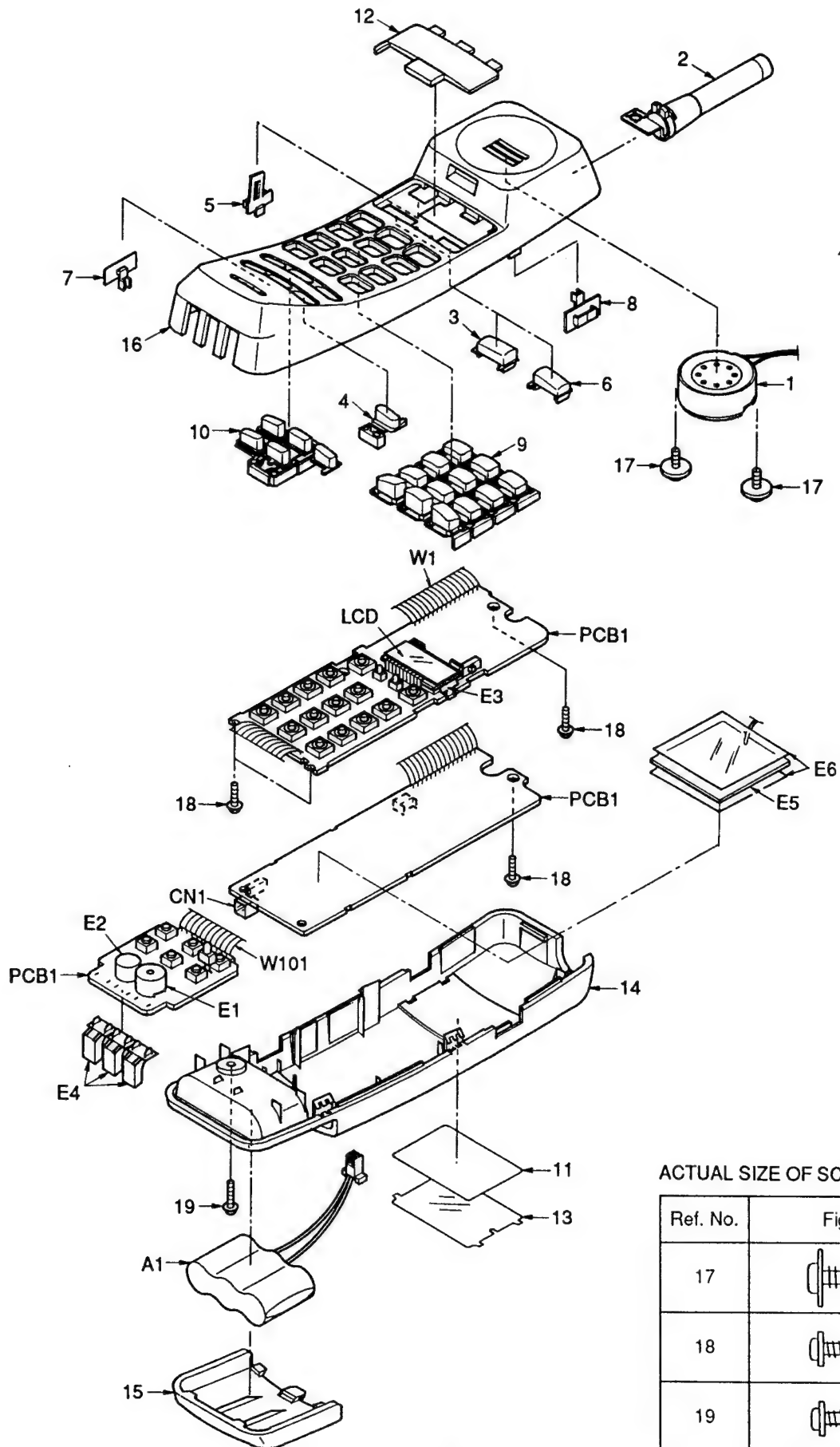


Fig. 49

This replacement parts list is for U.S.A. version only. Refer to the simplified manual (cover) for other areas.

## REPLACEMENT PARTS LIST

### Model KX-T3950H

#### 1. RTL (Retention Time Limited)

Note: The marking (RTL) indicates that the Retention Time is limited for this item.

After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing part and product retention. After the end of this period, the assembly will no longer be available.

#### 2. Important safety notice.

Components identified by the  $\Delta$  mark special characteristics important for safety. when replacing any of these components, use only manufacture's specified parts.

3. The S mark indicates service standard parts and may differ from production parts.

#### 4. RESISTORS & CAPACITORS

Unless otherwise specified.

All resistors are in ohms(  $\Omega$  ) k=1000 $\Omega$ , M=1000k $\Omega$

All capacitors are in MICRO FARADS(  $\mu$ F ) P= $\mu$ F

\*Type & Wattage of Resistor

Type

ERC:Solid	ERX:Metal Film	PQ4R:Carbon
ERD:Carbon	ERG:Metal Oxide	ERS:Fusible Resistor
PQRD:Carbon	ER0:Metal Film	ERF:Cement Resistor

Wattage

10,16:1/8W	14,25:1/4W	12:1/2W	1:1W	2:2W	3:3W
------------	------------	---------	------	------	------

\*Type & Voltage of Capacitor

Type

ECFD:Semi-Conductor	ECCD,ECKD,ECBT,PQCB: Ceramic
ECQS:Styrol	ECQE,ECQV,ECQG: Polyester
PQCUV:Chlp	ECEA,ECSZ: Electrolytic
ECQMS:Mica	ECQP: Polypropylene

Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others	
1H: 50V	05: 50V	0F:3.15V	0J :6.3V	1V :35V
2A:100V	1:100V	1A:10V	1A :10V	50,1H:50V
2E:250V	2:200V	1V:35V	1C :16V	1J :63V
2H:500V		0J:6.3V	1E,25:25V	2A :100V

Ref. No.	Part No.	Part Name & Description	Pcs/Set
CABINET & ELECTRICAL PARTS			
100	PQAS5P22Z	SPEAKER	1
101	PQSA10012Z	ANTENNA	1
102	PQBC10085Z1	BUTTO, PAGE/INTERCOM	1
103	PQBC10086Z1	BUTTON, QUICK CHARGE	1
104	PQHR10170Z	TRANSPARENT PLATE for INDIATOR	1
105	PQKE10018Z1	HANDSET HANGER	1
106	PQKM10077Y1	UPPER CABINET	1
107	PQYF10030Y1	LOWER CABINET	1
108	PJHE5065Z	SCREW, for SPEAKER	3
109	PQQT10611Z	CAUTION LABEL	1
110	XTW3+S10P	SCREW (3 X 10)	2
111	XTW3+S14P*	SCREW (3 X 14)	5

Ref. No.	Part No.	Part Name & Description	Pcs/Set
PRINTED CIRCUIT BOARD PARTS			
PCB1	PQWPT3950H	P.C.BOARD ASSEMBLY (RTL)	1
IC1	AN6169K	(ICS) IC	1
IC2	AN6165SB	IC	1
IC3	PQVIMC145162	IC	1
IC4	MN150609KYA	IC	1
IC5	PQVIM64021FP	IC	1
IC201	PQVIMC34119M	IC	1
Q1	2SK543	(TRANSISTORS) TRANSISTOR(SI)	1
Q2	2SC2295	TRANSISTOR(SI) [or 2SC2413]	S 1
Q4	2SC2295	TRANSISTOR(SI) [or 2SC2413]	S 1
Q5	2SD1819A	TRANSISTOR(SI) [or 2SC4081]	1
Q6	2SD1819A	TRANSISTOR(SI) [or 2SC4081]	1
Q7	2SD1819A	TRANSISTOR(SI) [or 2SC4081]	1
Q8	UN5213	TRANSISTOR(SI)	S 1
Q9	PQVTFB1A4M	TRANSISTOR(SI)	1
Q13	2SD1819A	TRANSISTOR(SI) [or 2SC4081]	$\Delta$ 1
Q14	2SA1776P	TRANSISTOR(SI) [or 2SA1625]	$\Delta$ 1
Q15	2SD2136	TRANSISTOR(SI)	1
Q16	2SD1819A	TRANSISTOR(SI) [or 2SC4081]	1
Q17	2SB709A	TRANSISTOR(SI) [or 2SA1162]	S 1
Q18	2SD601R	TRANSISTOR(SI) [or 2SC2712]	S 1
Q19	2SA933	TRANSISTOR(SI) [or 2SA1309 or 2SA1317]	1
Q20	2SC1740S	TRANSISTOR(SI) [or 2SC3311]	S 1
Q21	2SD1819A	TRANSISTOR(SI) [or 2SC4081]	1
Q22	2SD1218A	TRANSISTOR(SI) [or 2SA1576]	S 1
Q201	2SD1819A	TRANSISTOR(SI) [or 2SC4081]	S 1
Q202	UN5213	TRANSISTOR(SI)	S 1
Q302	UN5213	TRANSISTOR(SI)	S 1
Q303	2SD1819A	TRANSISTOR(SI) [or 2SC4081]	1
D 1	MA4056	(DIODES) DIODE(SI)	S 1
D 2	PQVD1SV145	DIODE(SI)	S 1
D 3	PQVD1SV145	DIODE(SI)	S 1
D 4	1SS120	DIODE(SI) [or 1SS131]	S 1
D 5	1SS120	DIODE(SI) [or 1SS131]	S 1
D 6	MA4062	DIODE(SI)	S 1
D 7	1SS120	DIODE(SI)	S 1
D 8	MA4068	DIODE(SI)	S 1
D 9	MA4100	DIODE(SI)	S 1
D10	1SS120	DIODE(SI) [or 1SS131]	S 1
D14	1SS120	DIODE(SI) [or 1SS131]	S 1
D15	PQVDS1ZB40F1	DIODE(SI)	$\Delta$ 1
D20	LN31GCPHV	LED	1
D21	LN21RCPHV	LED	1
D22	LN41YPSLX	LED	1
D100	1SS120	DIODE(SI) [or 1SS131]	S 1
D101	1SS120	DIODE(SI) [or 1SS131]	S 1
D102	MA700A	DIODE(SI)	S 1
D103	MA700A	DIODE(SI)	S 1
D104	MA700A	DIODE(SI)	S 1
D105	MA700A	DIODE(SI)	S 1
D106	1SS120	DIODE(SI) [or 1SS131]	S 1
D200	MA4300	DIODE(SI)	1
D201	1SS120	DIODE(SI) [or 1SS131]	S 1

This replacement parts list is for U.S.A. version only. Refer to the simplified manual (cover) for other areas.

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Ref. No.	Part No.	Part Name & Description	Pcs/Set
JJ1	PQJ2HA2Z	(JACKS) JACK, DC IN-TEL.	1	R 1	ERJ3GEYJ681	(RESISTORS) 680	1
				R 2	ERJ3GEYJ223	22K	1
				R 3	ERJ3GEYJ103	10K	1
				R 4	ERJ3GEYJ683	68K	1
				R 5	PQ4R10XJ183	18K	1
S1	EVOQJ05Q	(SWITCHES) SWITCH	S 1	R 6	ERJ3GEYJ391	390	1
S2	PQSH1A57Z	SWITCH	1	R 7	ERJ3GEYJ104	100K	1
S3	PQSS2A27Z	SWITCH, DIALING MODE	1	R 8	ERJ3GEYJ103	10K	1
				R 9	ERJ3GEYJ563	56K	1
				R10	ERJ3GEYJ561	560	1
				R11	PQ4R10XJ272	2.7K	1
				R12	ERJ3GEYJ103	10K	1
T1	PQLA7A7	(COILS) COIL	S 1	R13	ERJ3GEYJ683	68K	1
T2	PQLA7A9	COIL	1	R14	PQ4R18XJ103	10K	1
T4	PQLA7A22	COIL	1	R15	ERDS2TJ331	330	1
T5	PQLA7A20	COIL	1	R16	ERJ3GEYJ222	2.2K	1
L1	ELEPK330KA	COIL	S 1	R17	ERJ3GEYJ103	10K	1
L2	ELEPK330KA	COIL	S 1	R18	Not Used		
L3	PQLQZ1154J	COIL	1	R19	ERJ3GEYJ682	6.8K	1
L4	PQLQZM1R0K	COIL	1				
L5	PQLQZM1R0K	COIL	1	R20	ERJ3GEYJ820	82	1
				R21	ERJ3GEYJ222	2.2K	1
				R22	ERJ3GEYJ562	5.6K	1
				R23	PQ4R10XJ682	6.8K	1
PC302	PQVIPC814K	(PHOTO COUPLERS) PHOTO ELECTRIC TRANSDUCER $\Delta$ S	1	R24	ERJ3GEYJ104	100K	1
PC303	PQVITLP627	PHOTO ELECTRIC TRANSDUCER $\Delta$ S	1	R25	ERJ3GEYJ683	68K	1
				R26	ERJ3GEYJ683	68K	1
				R27	ERJ3GEYJ104	100K	1
				R28	ERJ3GEYJ220	22	1
				R29	Not Used		
CF1	PQVFCFW455E	(CERAMIC FILTERS) CERAMIC FILTER	S 1	R30	Not Used		
CF2	RVFSFE107MSR	CERAMIC FILTER	S 1	R31	ERJ3GEYJ182	1.8K	1
				R32	ERJ3GEYJ223	22K	1
				R33	ERJ3GEYJ223	22K	1
				R34	ERJ3GEYJ104	100K	1
				R35	Not Used		
T6	PQLI2B201	(TRANSFORMERS) I.F. TRANSFORMER	1	R36	ERJ3GEYJ473	47K	1
T7	PQLT8F3A	TRANSFORMER	$\Delta$ 1	R37	ERJ3GEYJ105	1M	1
				R38	ERJ3GEYJ225	2.2M	1
				R39	ERJ3GEYJ822	8.2K	1
X1	PQVCJ10240C5	(CRYSTALS) CRYSTAL OSCILLATOR	1	R40	ERJ3GEYJ103	10K	1
X3	PQVCJ3581N9Z	CRYSTAL OSCILLATOR	1	R41	ERJ3GEYJ683	68K	1
				R42	ERJ3GEYJ221	220	1
				R43	ERJ3GEYJ224	220K	1
				R44	ERJ3GEYJ224	220K	1
				R45	ERJ3GEYJ683	68K	1
TC1	ECRLA030E53	(OTHERS) TRIMMER CAPACITOR	S 1	R46	ERJ3GEYJ104	100K	1
SA1	PQVDRA311PT2	VARIATOR (SURGE ABSORBER)	$\Delta$ 1	R47	ERJ3GEYJ154	150K	1
CH1	PQJM120Z	MICROPHONE	1	R48	ERJ3GEYJ472	4.7K	1
CH2	PQJT10050Z	TERMINAL for CHARGE	1	R49	ERJ3GEYJ103	10K	1
CH3	PQHG10180Y	MICROPHONE COVER	1				
DUP1	PQVFDX4649B1	PHOTO ELECTRIC TRANSDUCER	1	R50	ERJ3GEYJ223	22K	1
P01	PQRPAR390N	THERMISTOR (POSISTOR)	$\Delta$ 1	R51	ERJ3GEYJ273	27K	1
CH4	PQHR10171Z	MICROPHONE HOLDER	1	R52	ERJ3GEYJ681	680	1
				R53	ERJ3GEYJ333	33K	1
				R54	ERJ3GEYJ333	33K	1
				R55	ERJ3GEYJ333	33K	1
				R56	ERJ3GEYJ103	10K	1
				R57	ERJ3GEYJ153	15K	1
				R58	ERJ3GEYJ153	15K	1
				R59	ERJ3GEYJ153	15K	1
				R60	ERJ3GEYJ563	56K	1
				R61	ERD25TJ273	27K	1
				R62	ERJ3GEYJ273	27K	1
				R63	PQ4R18XJ224	220K	1
				R64	ERJ3GEYJ223	22K	1

**This replacement parts list is for U.S.A. version only. Refer to the simplified manual (cover) for other areas.**

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Ref. No.	Part No.	Part Name & Description	Pcs/Set
R65	PQ4R10XJ681	680	1	R130	ERJ3GEYJ153	15K	1
R66	ERJ3GEYJ104	100K	1	R131	ERDS2TJ153	15K	1
R67	PQ4R10XJ104	100K	1	R132	ERJ3GEYJ562	5.6K	1
R68	PQ4R10XJ104	100K	1	R133	ERD25TJ101	100	1
R69	PQ4R10XJ104	100K	1	R134	Not Used		
				R135	Not Used		
R70	PQ4R10XJ104	100K	1	R136	Not Used		
R71	PQ4R10XJ824	820K	1	R137	PQ4R10XJ472	4.7K	1
R72	ERJ3GEYJ104	100K	1				
R73	ERJ3GEYJ472	4.7K	1	R201	ERJ3GEYJ274	270K	1
R74	ERJ3GEYJ103	10K	1	R202	ERJ3GEYJ102	1K	1
R75	PQ4R10XJ104	100K	1	R203	ERJ3GEYJ472	4.7K	1
R76	ERDS2TJ101	100	1	R204	PQ4R10XJ223	22K	1
R77	ERJ3GEYJ102	1K	1	R205	ERJ3GEYJ333	33K	1
R78	ERD25TJ470	47	1	R206	PQ4R18XJ104	100K	1
R79	PQ4R18XJ102	1K	1	R207	ERDS2TJ123	12K	1
				R208	ERJ3GEYJ103	10K	1
R80	PQ4R10XJ103	10K	1	R209	ERJ3GEYJ332	3.3K	1
R81	PQ4R18XJ472	4.7K	1				
R82	ERD25TJ473	47K	1	R210	PQ4R18XJ682	6.8K	1
R83	ERJ3GEYJ681	680	1	R211	ERJ3GEYJ103	10K	1
R84	ERD25TJ102	1K	1	R212	PQ4R10XJ184	180K	1
R85	PQ4R18XJ151	150	1	R220	ERDS2TJ153	15K	1
R87	PQ4R18XJ104	100K	1				
R88	ERD25TJ470	47	1				
R89	Not Used						
				R310	ERJ3GEYJ273	27K	1
R90	PQ4R10XJ120	12	1	R311	ERJ3GEYJ334	330K	1
R91	PQ4R10XJ271	270	1	R312	ERJ3GEYJ222	2.2K	1
R92	Not Used			R313	ERJ3GEYJ820	82	1
R93	PQ4R10XJ103	10K	1	R314	ERJ3GEY0R00	0	1
R94	Not Used						
R95	Not Used						
R96	PQ4R10XJ681	680	1				
R97	ERJ3GEYJ223	22K	1				
R98	ERDS2TJ473	47K	1				
R99	ERJ3GEYJ472	4.7K	1				
R100	Not Used						
R101	ERDS2TJ472	4.7K	1				
R102	PQ4R10XJ104	100K	1				
R103	Not Used						
R104	PQ4R10XJ273	27K	1				
R105	ERJ3GEYJ0R00	0	1				
R106	ERJ3GEYJ183	18K	1				
R107	PQ4R10XJ222	2.2K	1				
R108	ERJ3GEYJ104	100K	1				
R109	ERJ3GEYJ104	100K	1				
						(CAPACITORS)	
R110	Not Used			C 1	PQCUV1H050DC	5P	1
R111	Not Used			C 2	ECUV1H103KBV	0.01	1
R112	ERDS2TJ101	100	1	C 3	ECUV1H220JCV	22P	1
R113	ERDS2TJ474	470K	1	C 4	Not Used		
R114	PQ4R10XJ473	47K	1	C 5	Not Used		
R115	Not Used			C 6	Not Used		
R116	ERJ3GEYJ103	10K	1	C 7	Not Used		
R117	ERJ3GEYJ154	150K	1	C 8	PQCUV1H150JC	15P	1
R118	Not Used			C 9	Not Used		
R119	PQ4R10XJ272	2.7K	1				
				C10	ECUV1H220JCV	22P	1
R120	ERD25TJ103	10K	1	C11	ECUV1H103KBV	0.01	1
R121	ERJ3GEYJ473	47K	1	C12	ECUV1H470JCV	47P	1
R122	ERJ3GEYJ473	47K	1	C13	ECUV1H680JCV	68P	1
R123	ERJ3GEYJ103	10K	1	C14	Not Used		
R124	ERJ3GEYJ104	100K	1	C15	ECUV1H330JCV	33P	1
R125	Not Used			C16	ECUV1H100DCV	10P	1
R126	Not Used			C17	ECUV1H220JCV	22P	1
R127	ERJ3GEY0R00	0	1	C18	ECUV1H030CCV	3P	1
R128	ERDS2TJ153	15K	1	C19	ECUV1H681JCV	680P	1
R129	ERJ3GEYJ153	15K	1	C20	ECUV1H102KBV	0.001	1
				C21	PQCUV1H103KB	0.01	1
				C22	PQCUV1H150JC	15P	1

This replacement parts list is for U.S.A. version only. Refer to the simplified manual (cover) for other areas.

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Ref. No.	Part No.	Part Name & Description	Pcs/Set
C23	ECUV1H150JC	15P	1	C91	PQCUV1E104MD	0.1	1
C24	ECUV1H103KBV	0.01	1	C92	ECUV1H104MD	0.1	S 1
C25	ECUV1H103KBV	0.01	1	C93	PQCUV1H103KB	0.01	1
C26	ECEA1EU4R7	4.7	1	C94	ECUV1H104MD	0.1	S 1
C27	ECUV1H103KBV	0.01	1	C95	ECUV1H103KBV	0.01	1
C28	ECUV1H103KBV	0.01	1	C96	Not Used		
C29	ECEA1HKS3R3	3.3	1	C97	Not Used		
C30	PQCUV1E104MD	0.1	1	C98	ECUV1H101JCV	100P	1
C31	Not Used			C99	Not Used		
C32	PQCUV1H103KB	0.01	1	C100	Not Used		
C33	PQCUV1H223KB	0.022	1	C101	PQCUV1H222KB	0.0022	1
C34	ECUV1H223MD	0.022	1	C102	PQCUV1H222KB	0.0022	1
C35	ECUV1H102KBV	0.001	1	C103	PQCUV1H822MD	0.0082	1
C36	ECUV1H102KBV	0.001	1	C104	ECUV1H103KB	0.01	1
C37	PQCUV1E104MD	0.1	1	C105	PQCUV1E104MD	0.1	1
C38	PQCUV1E104MD	0.1	1	C106	Not Used		
C39	PQCUV1E104MD	0.1	1	C107	Not Used		
C40	PQCUV1E104MD	0.1	1	C108	Not Used		
C41	ECEA1HKS010	1	1	C109	Not Used		
C42	ECEA1HU100	10	S 1	C110	ECUV1H102KBV	0.001	1
C43	PQCUV1E104MD	0.1	1	C111	ECEA1CKS100	10	1
C44	ECEA1HKS4R7	4.7	S 1	C112	ECEA1AU101	100	1
C45	PQCUV1H470JC	47P	1	C113	PQCBC1H101KB	100P	1
C46	Not Used			C114	ECKD2H681KB	680P	1
C47	ECEA1HU220	22	S 1	C150	ECUV1H103KB	0.01	1
C48	PQCUV1C683MD	0.068	1	C151	ECUV1H103KBV	0.01	1
C49	PQCUV1E104MD	0.1	1				
C50	PQCUV1E104MD	0.1	1	C201	PQCUV1H223KB	0.022	1
C51	ECEA1EU4R7	4.7	1	C202	PQCUV1E104MD	0.1	1
C52	ECEA1HU100	10	S 1	C203	ECUV1H471JCV	470P	1
C53	ECEA1HU100	10	S 1	C204	ECEA1HKS0R1	0.1	1
C54	Not Used			C205	ECEA1HKS4R7	4.7	1
C55	PQCUV1E104MD	0.1	1	C206	ECEA1HKS010	1	1
C56	Not Used			C207	PQCUV1H103KB	0.01	1
C61	Not Used			C208	PQCUV1E473MD	0.047	1
C62	ECQE2224KF	0.22	1	C209	PQCUV1E104MD	0.1	1
C63	ECKD2H681KB	680P	1	C210	PQCUV1E104MD	0.1	1
C64	ECKD2H681KB	680P	1	C211	PQCUV1H223KB	0.022	1
C65	ECEA1HU100	10	S 1				
C66	ECUV1H121JCV	120	1	C220	PQCUV1C105JC	1	1
C67	ECUV1H103KBV	0.01	1				
C68	ECUV1H152KBV	0.0015	1	C274	PQCUV1E104MD	0.1	1
C69	PQCUV1H223KB	0.022	1				
C70	ECEA1HKS4R7	4.7	S 1	C304	PQCUV1E104MD	0.1	1
C71	PQCUV1H223KB	0.022	1				
C72	ECUV1H221JCV	220P	1	C310	ECEA1AU102	1000	1
C73	ECUV1H222KBV	0.0022	1				
C74	PQCUV1E104MD	0.1	1	C329	PQCUV1E104MD	0.1	1
C75	PQCUV1E104MD	0.1	1	C330	PQCUV1H104ZF	0.1	1
C76	ECEA1CKS100	10	1				
C77	PQCUV1H103KB	0.01	1				
C78	ECEA1EU101	100	S 1				
C79	ECEA1CU221	220	1				
C80	ECEA0JU102	1000	1				
C81	PQCUV1C224ZF	0.22	1				
C82	ECEA0JU102	1000	1				
C83	PQCUV1E104MD	0.1	1				
C84	ECUV1H220JCV	22P	1				
C85	ECUV1H220JCV	22P	1				
C86	PQCUV1E104MD	0.1	1				
C87	PQCUV1H222KB	0.0022	1				
C88	PQCUV1E104MD	0.1	1				
C89	ECUV1H331JCV	330P	1				
C90	Not Used						

This replacement parts list is for U.S.A. version only. Refer to the simplified manual (cover) for other areas.

## REPLACEMENT PARTS LIST

### Model KX-T3950R

#### 1. RTL (Retention Time Limited)

Note: The marking (RTL) indicates that the Retention Time is limited for this item.

After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing part and product retention. After the end of this period, the assembly will no longer be available.

#### 2. Important safety notice.

Components identified by the  $\Delta$  mark special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

3. The S mark indicates service standard parts and may differ from production parts.

#### 4. RESISTORS & CAPACITORS

Unless otherwise specified.

All resistors are in ohms ( $\Omega$ ) k=1000 $\Omega$ , M=1000k $\Omega$

All capacitors are in MICRO FARADS ( $\mu$ F) P= $\mu$ F

\*Type & Wattage of Resistor

Type

ERC:Solid	ERX:Metal Film	PQ4R:Carbon
ERD:Carbon	ERG:Metal Oxide	ERS:Fusible Resistor
PQRD:Carbon	ERO:Metal Film	ERF:Cement Resistor

Wattage

10,16:1/8W	14,25:1/4W	12:1/2W	1:1W	2:2W	3:3W
------------	------------	---------	------	------	------

\*Type & Voltage of Capacitor

Type

ECFD:Semi-Conductor	ECCD,ECKD,ECBT,PQBCB: Ceramic
ECQS:Styrol	ECQE,ECQV,ECQG: Polyester
PQCUV:Chlp	ECEA,ECSZ: Electrolytic
ECQMS:Mica	ECQP: Polypropylene

Voltage

ECQ Type	ECQG Type	ECSZ Type	Others	
1H: 50V	05: 50V	0F:3.15V	0J :6.3V	1V :35V
2A:100V	1:100V	1A:10V	1A :10V	50,1H:50V
2E:250V	2:200V	1V:35V	1C :16V	1J :63V
2H:500V		0J:6.3V	1E,25:25V	2A :100V

Ref. No.	Part No.	Part Name & Description	Pcs/Set
CABINET & ELECTRICAL PARTS			
1	PQAX3P16Z	SPEAKER	1
2	PQSA10013Z	ANTENNA	1
3	PQBC10082Z1	BUTTON, TALK	1
4	PQBC10083Z1	BUTTON, SECURE	1
5	PQBC10084Z1	BUTTON, CHANNEL	1
6	PQBC10091Z1	BUTTON, PAGE/INT	1
7	PQBD10022Z1	KNOB, POWER	1
8	PQBD10023Z1	KNOB, VOLUME	1
9	PQBX10130Z1	BUTTON, DIAL	1
10	PQBX10131Z1	BUTTON, PAUSE, AUTO etc.	1
11	PQGD10077Z	CARD, TEL. NO.	1
12	PQGP10049Z1	PANEL, LCD	1
13	PQGV10021Z	TRANSPARENT PLATE	1
14	PQKF10062Z1	CABINET COVER (REAR)	1
15	PQKK10021Z1	LID, BATTERY	1
16	PQKM10076Y1	CABINET BODY (FRONT)	1
17	PJHE5065Z	TAPPING SCREW	2
18	XTW26+10E	TAPPING SCREW	4
19	XTW26+12F	TAPPING SCREW	1

Ref. No.	Part No.	Part Name & Description	Pcs/Set
PRINTED CIRCUIT BOARD PARTS			
PCB1	PQWPT3950R	P.C. BOARD ASSEMBLY (RTL)	1
(ICS)			
IC1	PQVIXC79159	IC	1
IC2	PQVIM64021FP	IC	1
IC101	MN150804KZC	IC	1
IC102	PQVISC78184D	IC	1
(TRANSISTORS)			
Q1	2SK543	TRANSISTOR(SI)	1
Q2	2SC2295	TRANSISTOR(SI) [or 2SC2413K]	S 1
Q3	2SC2412K	TRANSISTOR(SI)	1
Q4	2SC2295	TRANSISTOR(SI) [or 2SC2413K]	S 1
Q101	XN1116	TRANSISTOR(SI)	1
Q102	2SA1036KQ146	TRANSISTOR(SI)	1
Q103	2SD601R	TRANSISTOR(SI) [or 2SC2712G]	S 1
Q104	2SD601R	TRANSISTOR(SI) [or 2SC2712G]	S 1
Q105	2SD601R	TRANSISTOR(SI) [or 2SC2712G]	S 1
Q106	2SD601R	TRANSISTOR(SI) [or 2SC2712G]	S 1
Q107	2SB709A	TRANSISTOR(SI) [or 2SA1162G]	S 1
Q108	2SD1819A	TRANSISTOR(SI) [or 2SC4081S]	1
Q201	2SD1819A	TRANSISTOR(SI) [or 2SC4081S]	1
(DIODES)			
D1	PQVD1SV145	DIODE(SI)	S 1
D3	PQVD1SV145	DIODE(SI)	S 1
D101	MA700A	DIODE(SI)	S 1
D102	MA700A	DIODE(SI)	S 1
D103	PQVDSL22MG1	LED	1
D104	PQVDSL33MC3	LED	1
D105	PQVDSL33MC3	LED	1
D107	MA723	DIODE(SI)	1
D108	MA723	DIODE(SI)	1
D109	MA723	DIODE(SI)	1
D110	MA723	DIODE(SI)	1
D113	MA723	DIODE(SI)	1
D201	1SS131	DIODE(SI)	S 1
DB	1SS120	DIODE(SI) [or 1SS131]	S 1
DD	1SS120	DIODE(SI) [or 1SS131]	S 1
DH	1SS120	DIODE(SI) [or 1SS131]	S 1
(CONNECTORS)			
CN1	PQJP2D59Z	CONNECTOR, 2 PIN	1
(SWITCHES)			
S1	ESD11H120	SWITCH, POWER	1
S2	PQSH1A44Z	SWITCH, CHANNEL	1
S101	PQSH1A57Z	SWITCH	1
S102	PQSH1A57Z	SWITCH	1
S103	EVQJJ05Q	SWITCH	S 1
S104	EVQJJ05Q	SWITCH	S 1
S105	EVQJJ05Q	SWITCH	S 1
S106	EVQJJ05Q	SWITCH	S 1
S107	EVQJJ05Q	SWITCH	S 1
S108	EVQJJ05Q	SWITCH	S 1
S109	EVQJJ05Q	SWITCH	S 1
S110	EVQJJ05Q	SWITCH	S 1

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Ref. No.	Part No.	Part Name & Description	Pcs/Set	Ref. No.	Part No.	Part Name & Description	Pcs/Set
S111	EVQQJJ05Q	SWITCH	S 1	(RESISTORS)			
S112	EVQQJJ05Q	SWITCH	S 1	R 1	ERJ3GEYJ333	33K	1
S113	EVQQJJ05Q	SWITCH	S 1	R 2	ERJ3GEYJ152	1.5K	1
S114	EVQQJJ05Q	SWITCH	S 1	R 3	ERJ3GEYJ102	1K	1
S115	ESD11H120	SWITCH	S 1	R 4	ERJ3GEYJ152	1.5K	1
S116	EVQ21404M	SWITCH	S 1	R 5	ERJ3GEYJ333	33K	1
S117	EVQ21404M	SWITCH	S 1	R 6	ERDS2TJ334	330K	1
S118	EVQ21404M	SWITCH	S 1	R 7	ERJ3GEYJ154	150K	1
S119	EVQ21404M	SWITCH	S 1	R 8	ERJ3GEYJ474	470K	1
S120	EVQ21404M	SWITCH	S 1	R 9	ERJ3GEYJ334	330K	1
S121	EVQ21404M	SWITCH	S 1	R10	ERJ3GEYJ562	5.6K	1
X1	PQVCJ10240C5	CRYSTAL OSCILLATOR	1	R11	ERJ3GEY0R00	0	1
	PQVCJ3581N9Z	CRYSTAL OSCILLATOR	1	R12	ERJ3GEYJ103	10K	1
	PQVCJ3992N9Z	CRYSTAL OSCILLATOR	1	R13	ERJ3GEYJ182	1.8K	1
	PQVCL3276N9Z	CRYSTAL OSCILLATOR	1	R14	ERJ3GEYJ331	330	1
(CRYSTALS)				R15	Not Used		
(COILS)				R16	ERJ3GEYJ224	220K	1
T1	PQLA7A9	COIL	1	R17	ERJ3GEYJ823	82K	1
T2	PQLI2B201	I.F. TRANSFORMER	1	R18	ERJ3GEYJ104	100K	1
T3	PQLA7A11	COIL	1	R19	PQ4R10XJ273	27K	1
T4	PQLA7A22	COIL	1	R20	PQ4R10XJ220	22	1
T5	PQLA7A7	COIL	1	R21	PQ4R10XJ331	330	1
L1	PQLQZM100K	COIL	S 1	R22	Not Used		
L2	PQLQZM1R5K	COIL	S 1	R23	Not Used		
L101	PQLQZM1R0K	COIL	S 1	R24	ERJ3GEYJ223	22K	1
(VARIABLE RESISTORS)				R25	PQ4R10XJ153	15K	1
VR2	EVNDXAA03B35	SEMI-FIXED RESISTOR, 300kΩ(B)	1	R26	ERJ3GEYJ563	56K	1
VR3	EVNDXAA03B35	SEMI-FIXED RESISTOR, 300kΩ(B)	1	R27	ERDS2TJ823	82K	1
(WIRES)				R28	ERJ3GEYJ103	10K	1
W1	WBX19SH-3SS	LEAD WIRE	1	R29	ERDS2TJ104	100K	1
W101	WBJ11SH-4SS	LEAD WIRE	1	R30	ERJ3GEY0R00	0	1
(CERAMIC FILTERS)				R31	PQ4R10XJ220	22	1
CF1	PQVFCFW455E	CERAMIC FILTER	S 1	R32	PQ4R10XJ154	150K	1
CF2	RVFSFE107MSR	CERAMIC FILTER	S 1	R33	Not Used		
(OTHERS)				R34	PQ4R10XJ470	47	1
TC1	ECRLA030E53	TRIMMER CAPACITOR	S 1	R35	PQ4R10XJ393	39K	1
LCD	PQADB5659AZ	LIQUID CRYSTAL DISPLAY	1	R36	Not Used		
DUP1	PQVFDX4649H6	PHOTO ELECTRIC TRANSDUCER	1	R37	PQ4R10XJ470	47	1
E1	PQEFBC12GP03	BUZZER	1	R38	PQ4R10XJ220	22	1
E2	PQJM124Z	MICROPHONE	1	R39	PQ4R10XJ223	22K	1
E3	PQHR10158Z	SPACER, LCD	1	R40	PQ4R10XJ561	560	1
E4	PQJT10039Z	BATTERY TERMINAL	3	R41	PQ4R10XJ223	22K	1
E5	PQMC10008Z	SHIELD COVER	1	R42	Not Used		
E6	PQHX10039Z	SHIELD COVER	2	R43	ERJ3GEYJ104	100K	1
				R44	ERJ3GEYJ223	22K	1
				R45	ERJ3GEYJ562	5.6K	1
				R46	Not Used		
				R47	ERJ3GEY0R00	0	1
				R48	ERJ3GEYJ224	220K	1
				R49	ERJ3GEYJ103	10K	1
				R50	ERJ3GEYJ334	330K	1
				R51	ERJ3GEYJ105	1M	1
				J10~16	ERJ3GEY0R00	0	23
				,50			
				121~132,			
				,200			
				,201			
				,203			
				J1~3,5,	PQ4R10XJ000	0	13
				100~108			
				J4,109,	PQ4R18XJ000	0	7
				110,160			
				,161,202			
				,D112			
				R101	PQ4R10XJ334	330K	1



This replacement parts list is for U.S.A. version only. Refer to the simplified manual (cover) for other areas.

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Ref. No.	Part No.	Part Name & Description	Pcs/Set
R102	ERJ3GEYJ334	330K	1	C20	PQCUV1H472KB	0.0047	1
R103	ERJ3GEYJ334	330K	1	C21	PQCUV1H103KB	0.01	1
R104	ERJ3GEYJ334	330K	1	C22	PQCUV1E104MD	0.1	1
R105	ERJ3GEYJ334	330K	1	C23	PQCUV1E104MD	0.1	1
R106	ERJ3GEYJ334	330K	1	C24	PQCUV1E104MD	0.1	1
R107	Not Used			C25	PQCUV1H103KB	0.01	1
R108	Not Used			C26	ECEA1HKS010	1	1
R109	ERJ3GEYJ103	10K	1	C27	PQCUV1E104MD	0.1	1
				C28	PQCUV1H103KB	0.01	1
R110	ERDS2TJ681	680	1	C29	Not Used		
R111	PQ4R10XJ681	680	1				
R112	ERDS2TJ681	680	1	C30	ECEA1HKS47	0.47	1
R113	ERJ3GEYJ682	6.8K	1	C31	Not Used		
R114	ERJ3GEYJ563	56K	1	C32	ECEA1CKS100	10	1
R115	PQ4R10XJ680	68	1	C33	ECEA0JKS101	100	1
R116	ERJ3GEYJ122	1.2K	1	C34	PQCUV1C683MD	0.068	1
R117	PQ4R10XJ562	5.6K	1	C35	PQCUV1E104MD	0.1	1
R118	PQ4R10XJ392	3.9K	1	C36	PQCUV1C683MD	0.068	1
R119	Not Used			C37	ECUV1H103KBV	0.01	1
				C38	Not Used		
R120	ERDS2TJ221	220	1	C39	PQCUV1H220JC	22P	1
R121	PQ4R18XJ104	100K	1				
R122	ERJ3GEYJ334	330K	1	C40	PQCUV1H103KB	0.01	1
R123	ERJ3GEYJ334	330K	1	C41	PQCUV1H103KB	0.01	1
R124	Not Used			C42	PQCUV1H220JC	22P	1
R125	PQ4R10XJ104	100K	1	C43	PQCUV1H103KB	0.01	1
R126	PQ4R10XJ472	4.7K	1	C44	Not Used		
R127	ERJ3GEYJ103	10K	1	C45	Not Used		
R128	PQ4R10XJ223	22K	1	C46	PQCUV1H220JC	22P	1
R129	PQ4R18XJ223	22K	1	C47	PQCUV1H103KB	0.01	1
				C48	PQCUV1H470JC	47P	1
R130	PQ4R18XJ122	1.2K	1	C49	PQCUV1H680JC	68P	1
R131	ERJ3GEYJ332	3.3K	1				
R132	ERJ3GEYJ122	1.2K	1	C50	PQCUV1H330JC	33P	1
R133	ERJ3GEYJ104	100K	1	C51	PQCUV1H150JC	15P	1
R134	ERJ3GEYJ104	100K	1	C52	Not Used		
R135	ERJ3GEYJ104	100K	1	C53	PQCUV1H180JC	18P	1
R136	PQ4R10XJ120	12	1	C54	ECUV1H030CCV	3P	1
R137	Not Used			C55	ECUV1H102KBV	0.001	1
R138	PQ4R10XJ334	330K	1	C56	PQCUV1H223KB	0.022	1
R139	Not Used			C57	PQCUV1H100DC	10P	1
				C58	PQCUV1E104MD	0.1	1
R140	PQ4R10XJ103	10K	1	C59	ECUV1H104ZEV	0.1	1
				C60	PQCUV1E104MD	0.1	1
				C61	PQCUV1E104MD	0.1	1
				C62	ECUV1H222KBV	0.0022	1
				C70	PQCUV1H181JC	180P	1
		(CAPACITORS)					
C1	PQCUV1H103KB	0.01	1	C101	ECUV1H180JCV	18P	1
C2	ECUV1H103KBV	0.01	1	C102	ECUV1H180JCV	18P	1
C3	ECEA1CKS100	10	1	C103	PQCUV1H103KB	0.01	1
C4	PQCUV1E104MD	0.1	1	C104	ECUV1H100DCV	10P	1
C5	ECUV1H223KBV	0.022	1	C105	ECUV1H100DCV	10P	1
C6	ECUV1H150JCV	15P	1	C106	PQCUV1H103KB	0.01	1
C7	PQCUV1E104MD	0.1	1	C107	ECEA0GKS221	220	1
C8	PQCUV1E104MD	0.1	1	C108	PQCUV1E104MD	0.1	1
C9	PQCUV1E104MD	0.1	1	C109	PQCUV1H103KB	0.01	1
C10	PQCUV1E104MD	0.1	1	C112	PQCUV1C105JC	1	1
C11	Not Used						
C12	ECEA1HKS010	1	1				
C13	PQCUV1E104MD	0.1	1				
C14	PQCUV1E104MD	0.1	1				
C15	ECUV1H332KBV	0.0033	1				
C16	ECEA0GKS470	47	1				
C17	PQCUV1H102J	0.001	1				
C18	Not Used						
C19	ECUV1H390JCV	39P	1				



This replacement parts list is for U.S.A. version only. Refer to the simplified manual (cover) for other areas.

KX-T3950			
Ref. No.	Part No.	Part Name & Description	Pcs/Set
ACCESSORIES & PACKING MATERIALS			
A1	KX-A36A	BATTERY	1
A2	KX-A11-5	AC ADAPTOR	1
A3	PQJA59V	TELEPHONE CORD	1
A4	PQKL24Z0	WALL MOUNT BRACKET	1
A5	PQQX10548Z	INSTRUCTION BOOK	1
A6	PQQW10485Z	INSTRUCTION BOOK (QUICK REFERENCE) [ENGLISH]	1
A7	PQQW10486Z	INSTRUCTION BOOK (QUICK REFERENCE) [SPANISH]	1
P1	PQPP10001Z	PROTECTION COVER (for HANDSET)	1
P2	PQPH89Y	PROTECTION COVER (for BASE UNIT)	1
P3	PQPK10473Z	GIFT BOX	1
P4	PQPN10207Z	PAD	1
P5	PQPN10208Z	ACCESSORY BOX	1

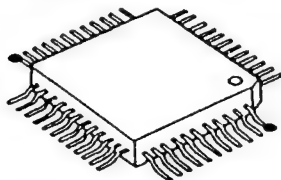
## HOW TO REPLACE FLAT PACKAGE IC

### ■ PREPARATION

- SOLDER ..... Sparkle Solder 115A-1, 115B-1  
OR  
Almit Solder KR-19, KR-19RMA
- Soldering iron ..... Recommended power consumption will be between  
30 W to 40 W.  
Temperature of Copper Rod  $662 \pm 50^{\circ} \text{F}$  ( $350 \pm 10^{\circ} \text{C}$ )  
(An expert may handle 60~80 W iron, but a beginner  
might damage the foil by overheating.)
- Flux ..... HI115                      Specific gravity 0.863  
(Original flux will be replaced daily.)

### ■ PROCEDURE

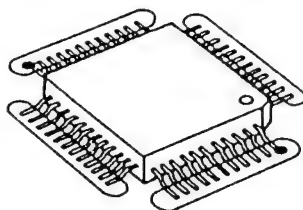
1. Temporary fix for FLAT PACKAGE IC by Soldering on the marked 2 pins.



● .....Temporary soldering point.

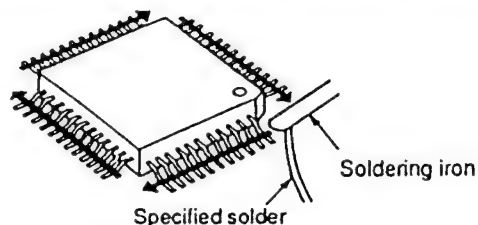
\*A most important matter is the accurate setting of IC to the corresponding soldering foil.

2. Apply flux for all pins of FLAT PACKAGE IC.



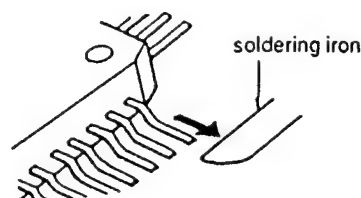
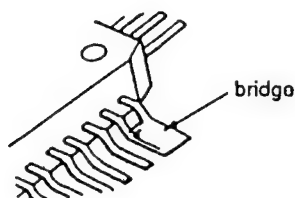
.....Flux

3. Employ the soldering iron as shown by the arrows in the figure below.



### ■ MODIFICATION PROCEDURE OF BRIDGE

1. Re-solder slightly on bridging portion.
2. Remove remained solder along pins employing soldering iron as shown in below Figure.



# Service Manual

**Supplement-1**

CORDLESSPHONE



Telephone Equipment

KX-T3935

KX-T3940

KX-T3950

KX-T3960

(for U.S.A.)

Please use this manual together with the original service manual for the below model.

**This supplement's subjects are:**

- 1. Correction of adjustments**
- 2. Addition of CPU terminal explanation**

Model No.	Order No.
KX-T3935	KM49309650C1
KX-T3940	KM49309649C1
KX-T3950	KM49309648C1
KX-T3960	KM49309645C1

# Panasonic

# CORRECTIONS

## SPECIFICATIONS

Model No.: KX-T3960 only

	Base unit (KX-T3960H)	Portable handset (KX-T3960R)
Power Source: (Receiver Section)	AC adaptor KX-A11-5 (DC 12 V)	Built-in rechargeable Ni-Cd battery (KX-A36A)
Receiving frequency:	10 channel within 49.6 to 49.9 MHz	10 channel within 46.6 to 46.9 MHz
Adjacent Channel Rejection:	40 dB	40 dB
Sensitivity: (Transmitter Section)	1 $\mu$ V for 20 dB S/N	2 $\mu$ V for 20 dB S/N
Transmitting Frequency:	10 channel within 46.6 to 46.9 MHz	10 channel within 49.6 to 49.9 MHz
Jacks:	DC IN, Telephone Line	
Antenna:	Rubber Flexible	Rubber Flexible
Speaker:	2" (5 cm) PM Dynamic	1 3/16" (3 cm) ceramic type
Microphone:	Condenser Microphone	Condenser Microphone
Dimensions (H×W×D):	2 11/32"×5 5/8"×9 1/16" (60×143×230 mm)	10"×2 3/16"×2" (254×56×51 mm)
Weight:	1.1 lbs. (497 g)	0.53 lbs. (242 g) with battery

Design and specifications are subject to change without notice.

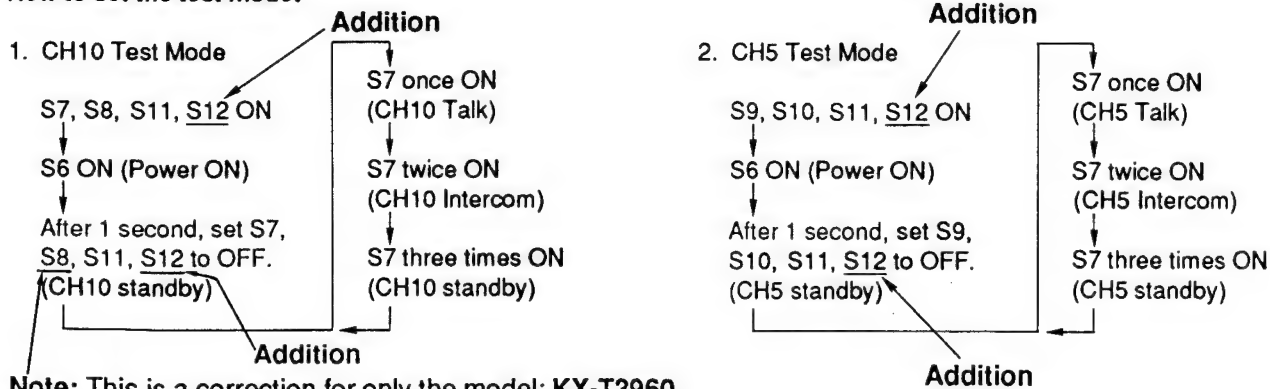
(Supplement)

## ADJUSTMENTS

Model No.: KX-T3935H / KX-T3940H / KX-T3950H / KX-T3960H

Note: Underlines indicate correction and additions.

How to set the test mode:



(Supplement)

Model No.: KX-T3950H / KX-T3960H

When replacing these parts, adjust as shown below table.

Replace Parts	Adjustment Items	Test Mode	Adjustment Points	Procedure
T2, Q2	(D) Power Adjustment (TX)	CH10 Talk	T2	<p>1. Connect the RF VTVM (connect 50<math>\Omega</math> resistor) to 4-5.</p> <p>2. Adjust T2 (clockwise) so that the reading of the RF VTVM is 150 mV<math>\pm</math>10 mV.</p>

Model No.: KX-T3960H only

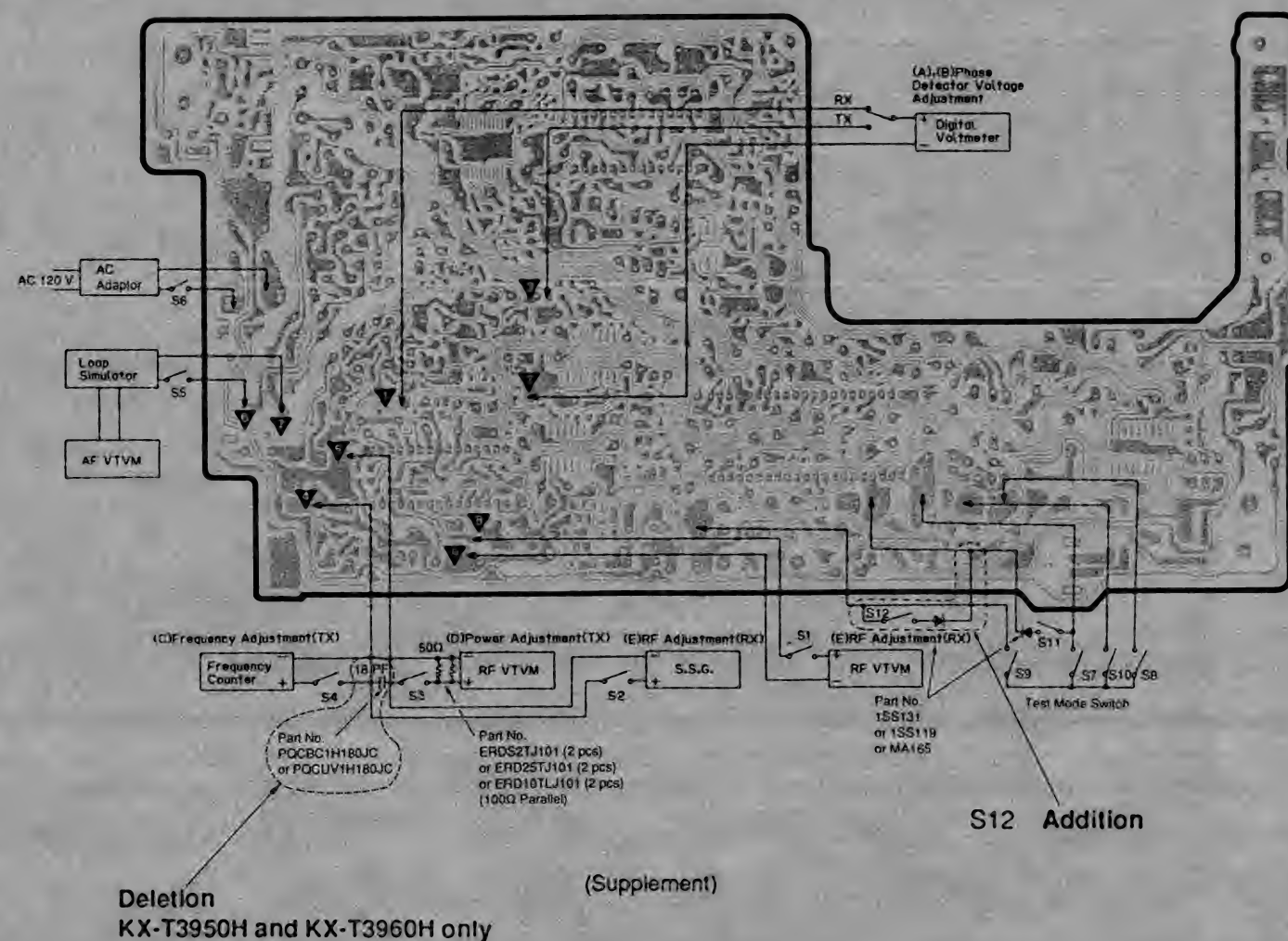
When replacing these parts, adjust as shown below table.

Replace Parts	Adjustment Items	Test Mode	Adjustment Points	Procedure
T1, T6	(E) RF Adjustment (RX)	CH5 Talk	T1 T6	<ol style="list-style-type: none"> <li>1. Connect S.S.G. to <math>\nabla</math>-<math>\nabla</math>.</li> <li>2. Connect the loop simulator and AF VTVM to <math>\nabla</math>-<math>\nabla</math>. Connect the RF VTVM to <math>\nabla</math>-<math>\nabla</math>.</li> <li>3. Apply a 60 dB<math>\mu</math>V output from S.S.G. (modulation frequency 1 kHz, dev. 3 kHz).</li> <li>4. Apply a DC 48 V from loop simulator.</li> <li>5. Adjust T1 so that the reading of the RF VTVM is maximum output.</li> <li>6. Apply a 40 dB<math>\mu</math>V output from S.S.G. (modulation frequency 1 kHz, dev. 3 kHz), and adjust T6 so that reading of the AF VTVM is maximum output.</li> </ol>

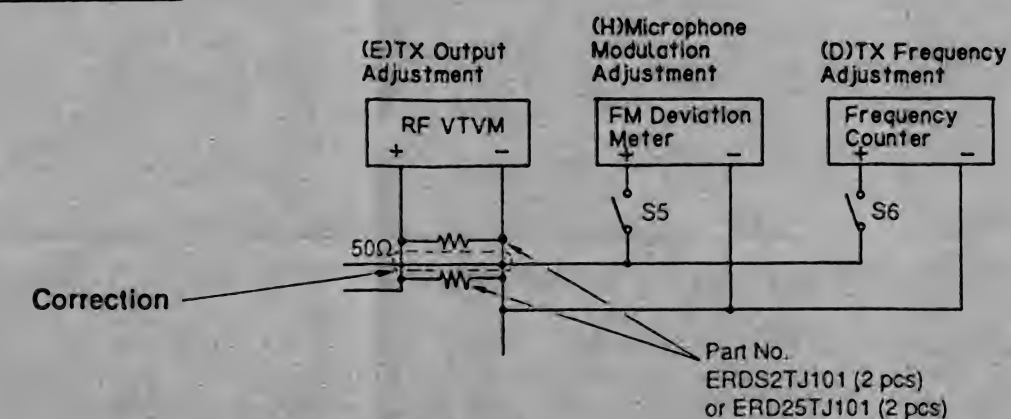
Correction

Model No.: KX-T3935H / KX-T3940H / KX-T3950H / KX-T3960H

Flow Solder Side View



Model No.: KX-T3940R only



ADDITIONS

Model No.: KX-T3935H / KX-T3940H / KX-T3950H / KX-T3960H

■ MN150609KYA (IC4) TERMINALS EXPLANATION

Pin No.	Pin Name	Classification	I/O	Description
1 4	V <sub>DD</sub> V <sub>SS</sub>	Power supply		For connection of +2.2-5.5 V to V <sub>DD</sub> and 0 V to V <sub>SS</sub> .
2 3	OSC1 OSC2	Clock input Clock output	I O	Oscillation terminal for connection of an oscillator. Feedback resistance is built in.
7	RST	Reset input	I	The reset mode is on when "L" level is input for 1 machine cycle or more. The pull-up resistance and the Schmitt input circuit are built in. After the RESET mode is off, the internal RESET is discontinued after 2 <sup>nd</sup> counts of OSC input clock.
8	SYNC	Synchronous signal output	O	Outputs internal timing signal every 1 machine cycle.
42	IRO	External interrupt input	I	For interrupt at a negative edge. The Schmitt input circuit is built in. The pull-up resistance can be designated by software option.
5	SIRO	External interrupt input	I	For unconditional interrupt at a negative edge. The Schmitt input circuit is built in. The pull-up resistance can be designated by software option.
37	SBT (PC0)	Serial interface clock I/O	I/O (I)	I/O terminal for transmission and reception of serial interface clock. This can be used as the normal input port. The Schmitt input circuit is built in. The pull-up resistance can be designated by software option.
38	SBO (PC1)	Serial interface data output	O (I)	Output terminal for transmission of the serial interface data (8-bit serial data). This can also be used as a normal input port. The pull-up resistance can be designated by software option.
39	SBI (PC2)	Serial interface data input	I (I)	Input terminal for reception of the serial interface data (8-bit serial data). This can also be used as a normal input port. The Schmitt input circuit is built in. The pull-up resistance can be designated by software option.
40	TC20 (PC3)	8-bit presetable counter data output	O (I)	Output terminal of overflow signal of the built-in 8-bit presetable counter. This can also be used as the normal input port. The pull-up resistance can be designated by software option.
6	DTMF	DTMF signal output	O	Output terminal of the staircase signal in which two types of frequency signals are mixed. The ON/OFF of output can be controlled by program.
33-36, 41	PA0-PA3, PD0	Large current for direct driving of LED	I/O	I/O ports of 4-bit parallel data. The output structure (Nch open drain/pushable) and the pull-up resistance can be designated by software option. The LED can be driven directly.
9-32	P00-P53	Parallel data I/O	I/O	I/O ports of 4-bit parallel data. The output structure (Nch open drain/pushable) and the pull-up resistance can be designated by software option.



■ MN150804KZC (IC101) TERMINALS EXPLANATION

Pin No.	Pin Name	Classification	I/O	Description
10 4	V <sub>DD</sub> V <sub>SS</sub>	Power supply		For connection of +2.2~5.5 V to V <sub>DD</sub> and 0 V to V <sub>SS</sub> . (4.5~5.5 V is connected to VFF when the A/D comparator is used.)
8 9	OSC1 OSC2	Clock input Clock output	I/O	Oscillation terminal for connection of an oscillator. Feedback resistance is built-in.
5 6	XI XO	Clock input Clock output	I/O	Oscillation terminal for connection of time base oscillation circuit. This can be used as the system clock input terminal by software change. Feedback resistance is built-in.
2	RST	Reset input	I	RESET mode is on when "L" level is input for 1 machine cycle or mode. The pull-up resistance and the Schmitt input circuit are built in. After the RESET mode is off, the internal RESET is released after 2 <sup>nd</sup> count of OSC input clock.
1	SYNC	Synchronous signal output	O	For output of the LCD driver frame clock. The timing signal of the CPU is output when the RESET is on.
57~60	P00~P03	10 V-proof parallel output	O	Output ports of 4-bit parallel data. The output structure: Nch open drain
61~64	P10~P13	Large current parallel output	O	Output ports of 4-bit parallel data. Output structure: Nch open drain
41~44	P20~P23	Parallel data I/O	I/O	I/O ports of 4-bit parallel data. Output structure: Nch open drain/pushable The pull-up resistance can be designated by software option.
47	P32/SBT	Parallel data I/O (serial interface, clock I/O)	I/O (I/O)	I/O port of parallel data Output structure: Nch open drain/pushable The pull-up resistance can be designated by software option. This can be used for transmission/reception of the serial interface clock by software change. The Schmitt input circuit is built in.
45, 46	P30, P31	Parallel data I/O	I/O	I/O ports of 4-bit parallel data. Output structure: Nch open drain/pushable The pull-up resistance can be designated by software option.
48	P33/SBD	Parallel data I/O (serial interface, data I/O)	I/O (I/O)	I/O port of parallel data. Output structure: Nch open drain/pushable The pull-up resistance can be designated by software option. This can be used for transmission/reception of the serial interface data by software change. The Schmitt input circuit is built in.
53	P50/SENS	Parallel data input (AC zero cross input)	I (I)	Input terminal of 4-bit parallel data. The pull-up resistance can be designated by software option. This can be used as the input terminal of the AC zero voltage detection circuit). Also, IRQ interrupt can be generated by IRQ and software change.
54	P51	Parallel data input	I	Input terminal of 4-bit parallel data. The pull-up resistance can be designated by software option.
55	P52/TCO	Parallel data input (8-bit presetable counter output)	I (O)	Input terminal of 4-bit parallel data. The pull-up resistance can be designated by software option. This can also be used as the overflow signal output terminal of the built-in 8-bit presetable counter by change.
56	P53/IRQ	Parallel data input (external interrupt input)	I	Input terminal of 4-bit parallel data. The pull-up resistance can be designated by software option. The Schmitt input circuit is built in. Also, IRQ interrupt can be generated by software change.

Pin No.	Pin Name	Classification	I/O	Description
49~52	P40/COMPA+ P43/COMPB-	Parallel data input (comparator input)	I (I)	Input port of 4-bit parallel data. The pull-up resistance can be designated by software option. This can be switched to the comparator input by software change. At this time, the "H" is output when the voltage on the positive side (+) of the input terminal is larger than that on the negative side (-). If the voltage on the positive side is smaller than that on the negative side, "L" is output.
11~13	VLCD1~3	Power source terminal for LCD		Power source terminal driving LCD VLCD1=VDD—(1/3) VLCD VLCD2=VDD—(2/3) VLCD VLCD3=VDD—VLCD VLCD: Voltage of LCD driving
14~21	SEG0~SEG7/ AD0~AD7	LCD segment output (AD input)	O (I)	Output terminal of LCD segment signal. This can also be used as the AC conversion input by software change. Up to 8 channels can be used.
25~32	SEG8~SEG15	LCD segment output	O	Output terminal of LCD segment signal.
33~36	SEG16~SEG19/ PA0~PA3	LCD segment output (parallel data output)	O (O)	Output terminal of LCD segment signal. Also, this can be used as the 4-bit parallel data output port. Output structure: Pushable
37~41	SEG20~SEG23/ PB0~PB3	LCD segment output (parallel data output)	O (O)	Output terminal of LCD segment signal. Also, this can be used as the 4-bit parallel data output port. Output structure: Pushable
3	VREF+	AD converter reference voltage input	I	Input terminal of the reference voltage for the AD converter. (Divided into 256 between VREF+~0 V.)
22~24	COM0~2	LCD common output	O	Output terminal of the common signal of the LCD.

ADJUSTMENTS (KX-T3950H)

If your unit have below symptom, adjust for each item following table of adjustment.

Symptom	Remedy
The base unit does not receive a call from portable handset.	Adjust the adjustment item (A)
The base unit does not transmit, and the transmit frequency is slipped.	Adjust the adjustment item (B)
The transmit frequency is slipped.	Adjust the adjustment item (C)
The transmit output is low, and the arrival distance is shorted between base unit and portable handset.	Adjust the adjustment item (D)
The reception sensitivity of base unit is wrong, the noise is occurred.	Adjust the adjustment item (E)

Unit condition:

Remove the antenna from P.C. Board of the base unit.

How to set the test mode:

1. CH10 Test Mode

S7, S8, S11 ON  
↓  
S6 ON (Power ON)  
↓  
After 1 second,  
set S7, S8, S11 to OFF.  
(CH10 Standby)

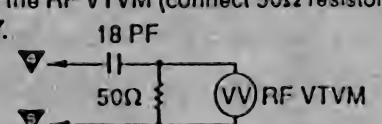
S7 once ON  
(CH10 Talk)  
↓  
S7 twice ON  
(CH10 Intercom)  
↓  
S7 three times ON  
(CH10 Standby)

2. CH5 Test Mode

S9, S10, S11 ON  
↓  
S6 ON (Power ON)  
↓  
After 1 second,  
set S9, S10, S11 to OFF.  
(CH5 Standby)

S7 once ON  
(CH5 Talk)  
↓  
S7 twice ON  
(CH5 Intercom)  
↓  
S7 three times ON  
(CH5 Standby)

When replacing these parts, adjust as shown below table.

Replace Parts	Adjustment Items	Test Mode	Adjustment Points	Procedure
IC1, T5	(A) Phase Detector Voltage Adjustment (RX)	CH10 Talk	T5	1. Connect the Digital Voltmeter to $\nabla$ - $\nabla$ . 2. Adjust T5 (counterclockwise) so that the reading of the Digital Voltmeter is $3.2\text{ V}\pm 0.1\text{ V}$ .
D2, D3, T4	(B) Phase Detector Voltage Adjustment (TX)	CH10 Talk	T4	1. Connect the Digital Voltmeter to $\nabla$ - $\nabla$ . 2. Adjust T4 (counterclockwise) so that the reading of the Digital Voltmeter is $3.2\text{ V}\pm 0.1\text{ V}$ .
DUP1, T2, TC1, X1	(C) Frequency Adjustment (TX)	CH10 Talk	TC1	1. Connect the frequency counter to $\nabla$ - $\nabla$ . 2. Adjust TC1 so that the reading of the frequency counter is $46.970\text{ MHz}\pm 300\text{ Hz}$ .
T2, Q2	(D) Power Adjustment (TX)	CH10 Talk	T2	1. Connect the RF VTVM (connect $50\Omega$ resistor) to $\nabla$ - $\nabla$ .  2. Adjust T2 (clockwise) so that the reading of the RF VTVM is $150\text{ mV}\pm 10\text{ mV}$ .

When replacing these parts, adjust as shown below table.

Replace Parts	Adjustment Items	Test Mode	Adjustment Points	Procedure
T1, T6	(E) RF Adjustment (RX)	CH5 Talk	T1  T6	1. Connect S.S.G. to $\nabla$ - $\nabla$ . 2. Connect the loop simulator and AF VTVM to $\nabla$ - $\nabla$ . Connect the RF VTVM to $\nabla$ - $\nabla$ . 3. Apply a $60\text{ dB}\mu\text{V}$ output from S.S.G. (modulation frequency $1\text{ kHz}$ , dev. $3\text{ kHz}$ ). 4. Apply a DC $48\text{ V}$ from loop simulator. 5. Adjust T1 so that the reading of the RF VTVM is maximum output. 6. Apply a $40\text{ dB}\mu\text{V}$ output from S.S.G. (modulation frequency $1\text{ kHz}$ , dev. $3\text{ kHz}$ ), and adjust T6 so that reading of the AF VTVM is maximum output.

Flow Solder Side View

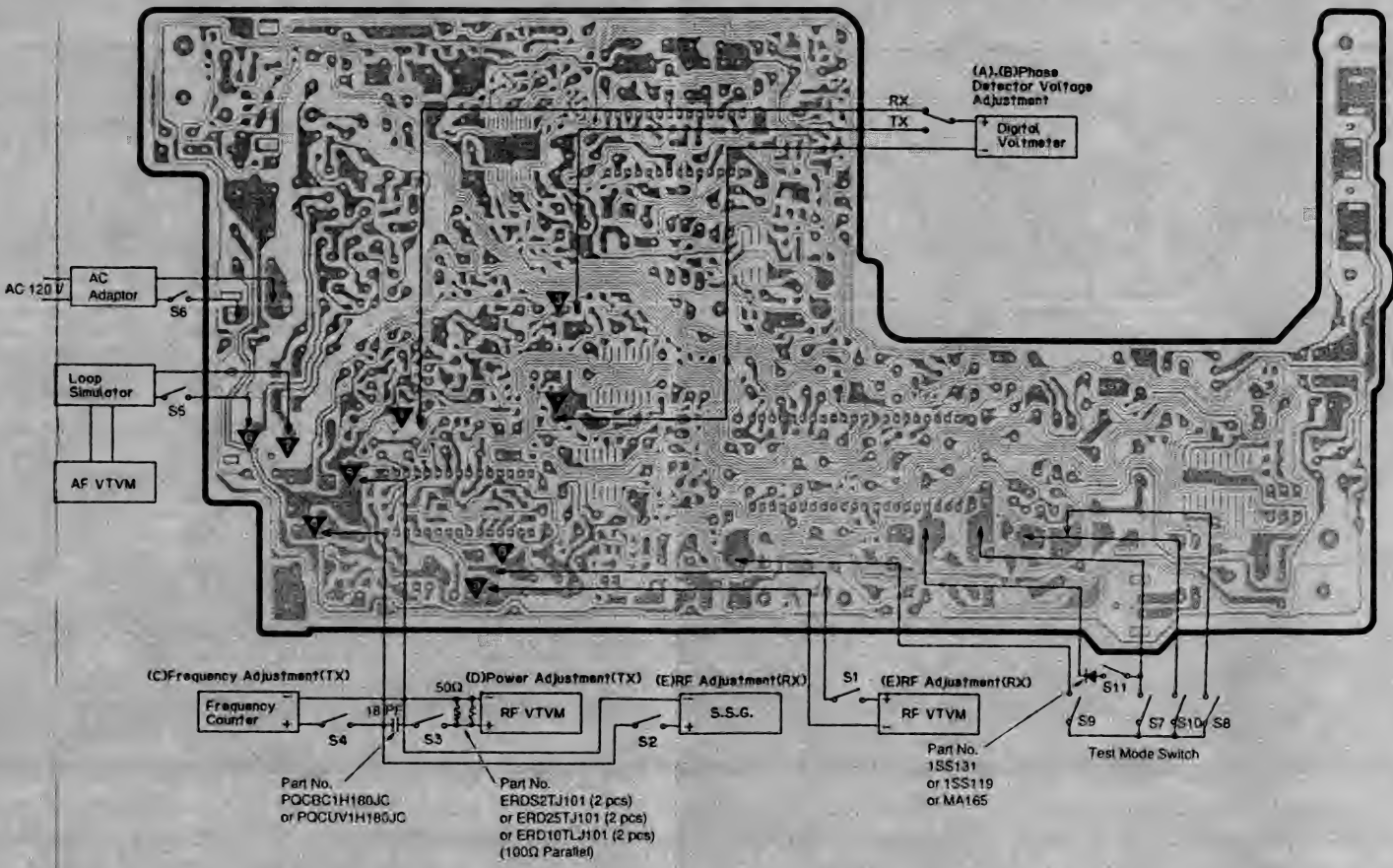


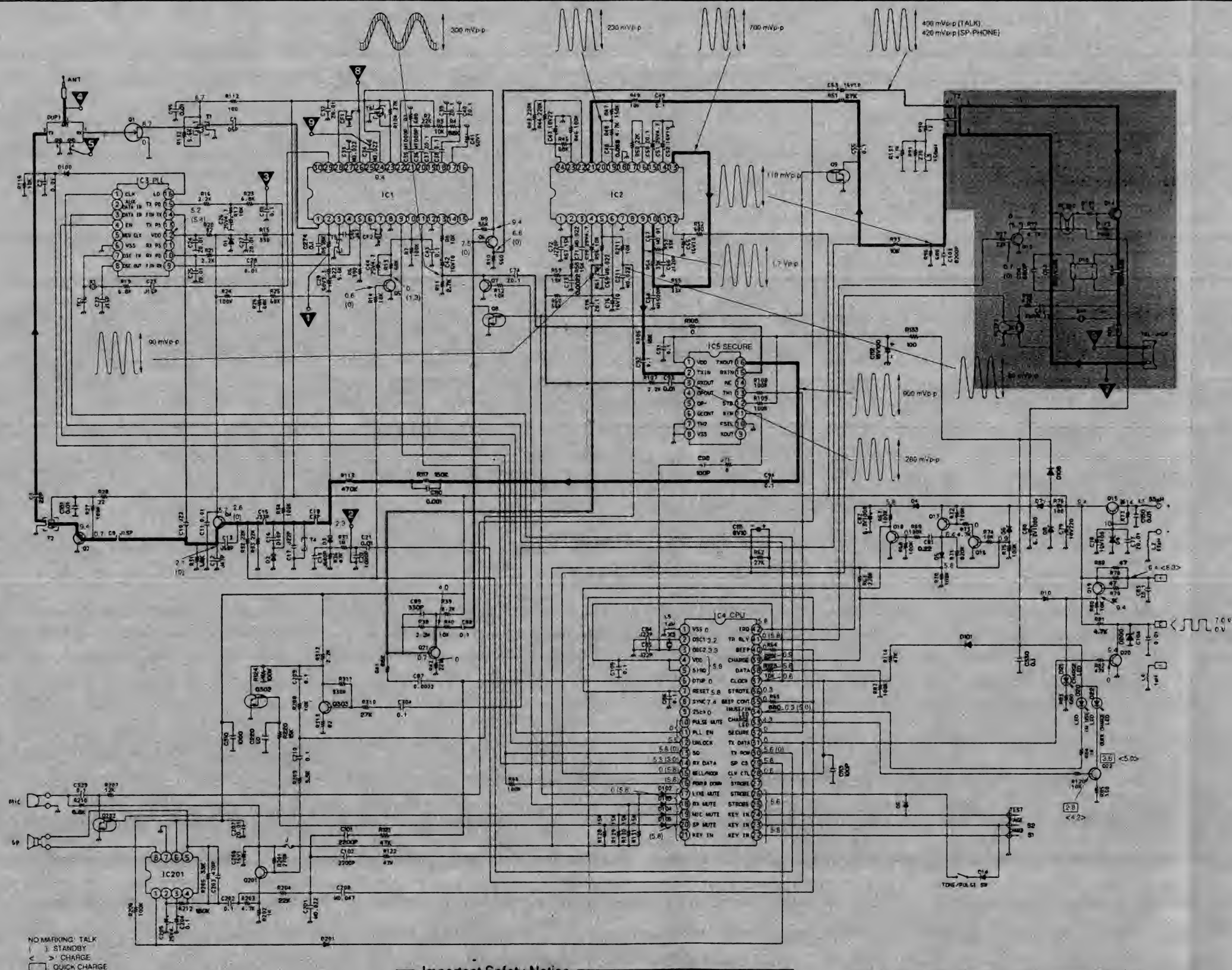
Fig. 11



KX-T3950

KX-T3950

## SCHEMATIC DIAGRAM (KX-T3950H)



## Notes:

1. Quick Charge Switch
2. S2: Page/Intercom Switch
3. S3: Dialing Mode Selector Switch

4. DC voltage measurements are taken with an electronic voltmeter from the negative voltage line.

## Important Safety Notice

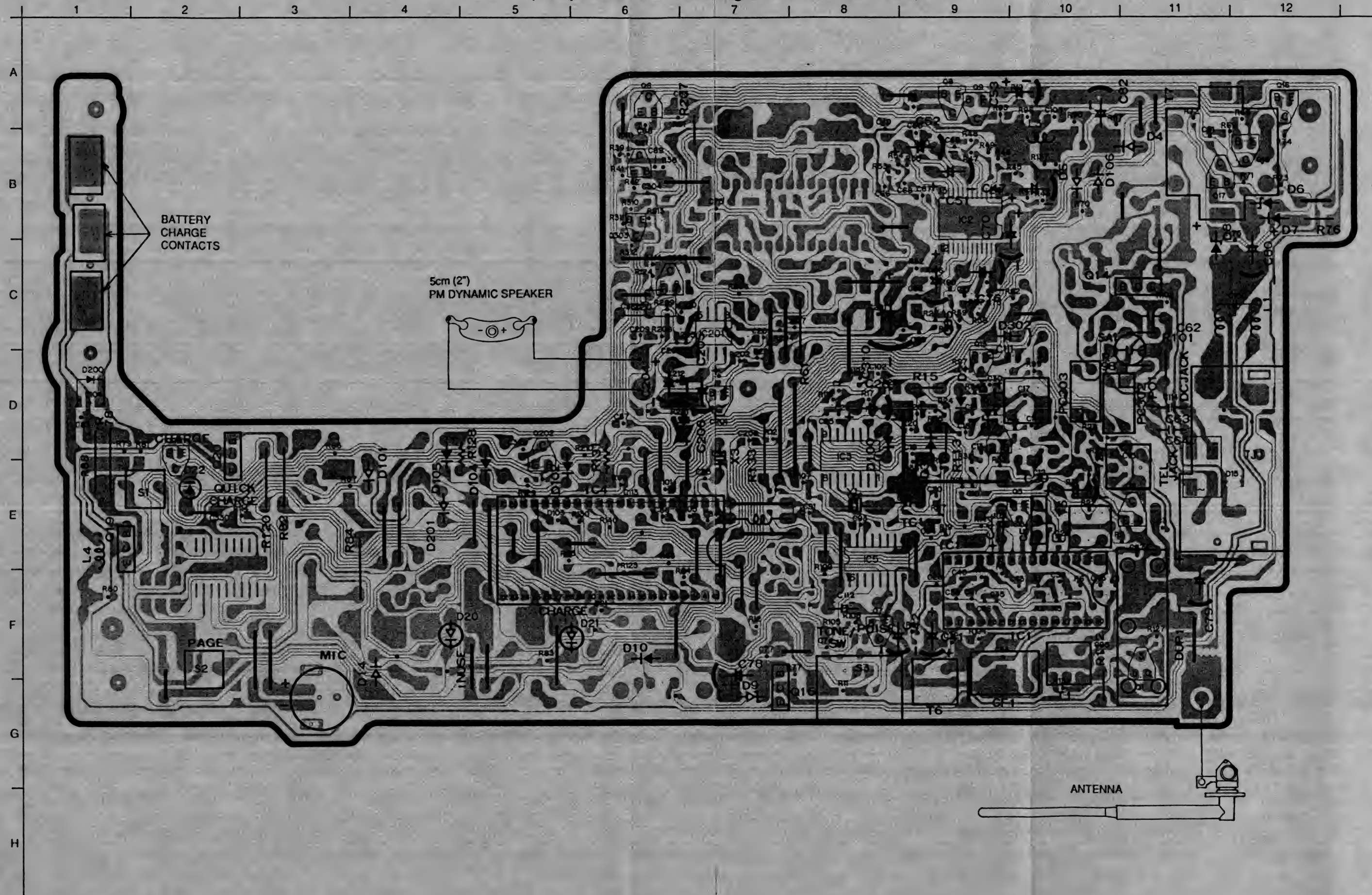
The shaded area on this schematic diagram incorporates special features important to safety from fire and electrical shock hazards. When servicing, it is essential that only manufacturers' specified parts be used for the critical components in the shaded areas of the schematic.

This schematic diagram may be modified at any time with the development of new technology.



## CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM (KX-T3950H)

(Component View: Including Flow Solder Side Parts)

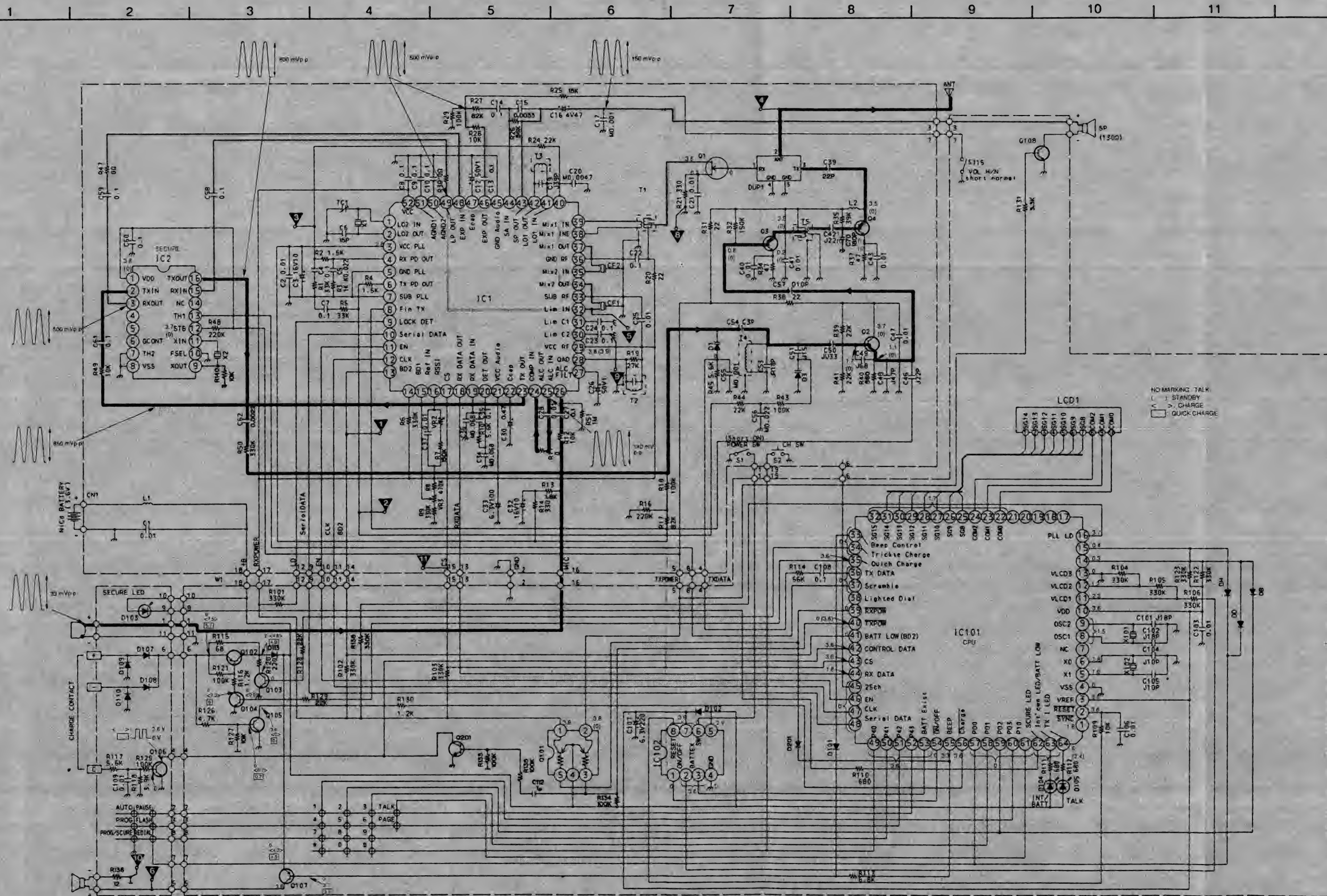




KX-T3950

KX-T3950

## SCHEMATIC DIAGRAM (KX-T3950R)



## Notes:

1. S1: Power/Ringer Switch
2. S2: Channel Switch
3. S101: Talk Switch
4. S102: Page/Intercom Switch
5. S103-S111, S113, S114: Dialing Switch
6. S112: Tone Switch
7. S115: Volume Selector Switch
8. S116: Pause Switch
9. S117: Flash Switch
10. S118: Redial Switch
11. S119: Auto Switch
12. S120: Program Switch
13. S121: Secure Switch
14. DC voltage measurements are taken with electronic voltmeter from negative voltage line

This schematic diagram may be modified at any time with the development of new technology.

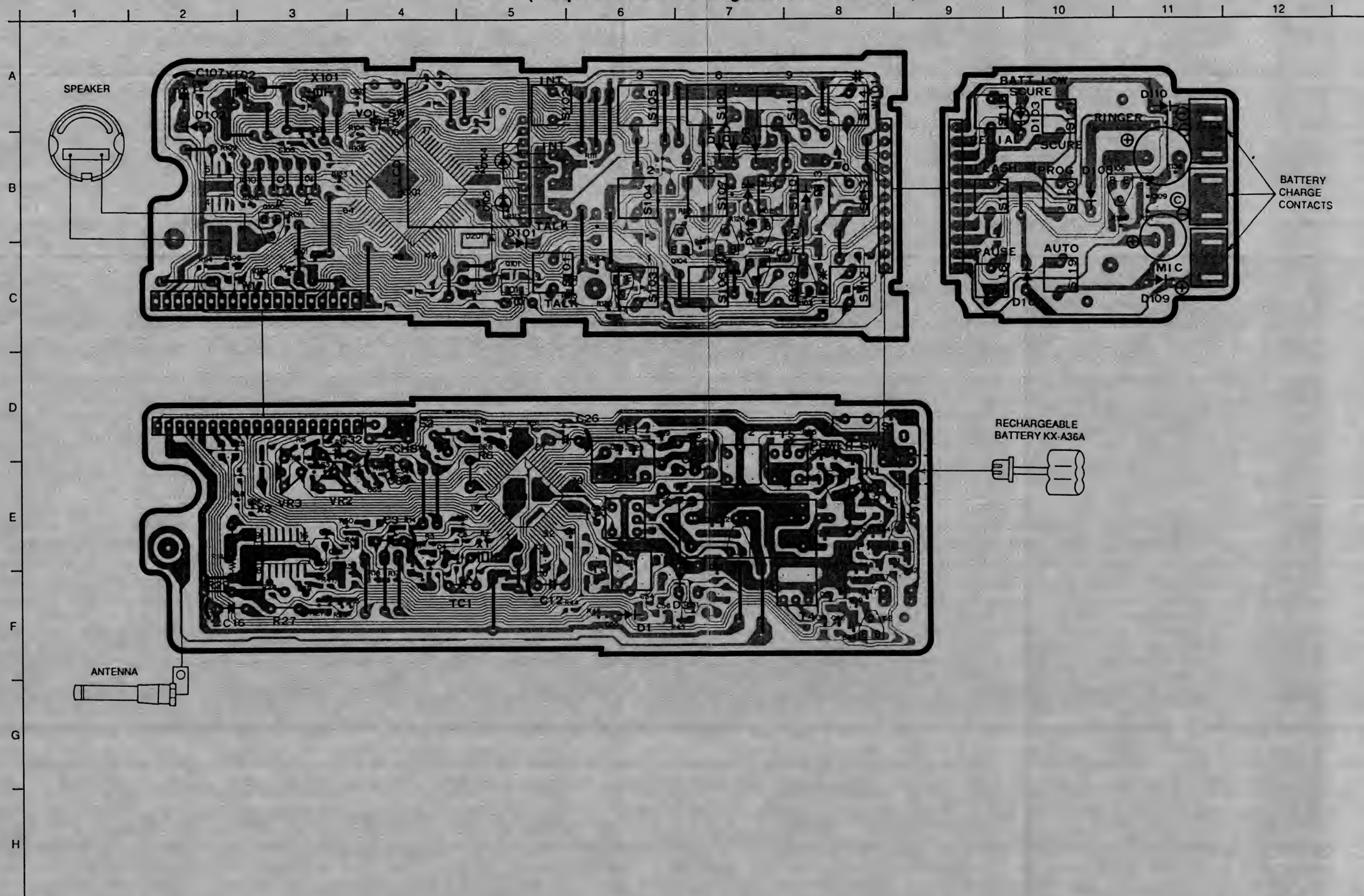


KX-T3950

KX-T3950

# CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM (KX-T3950R)

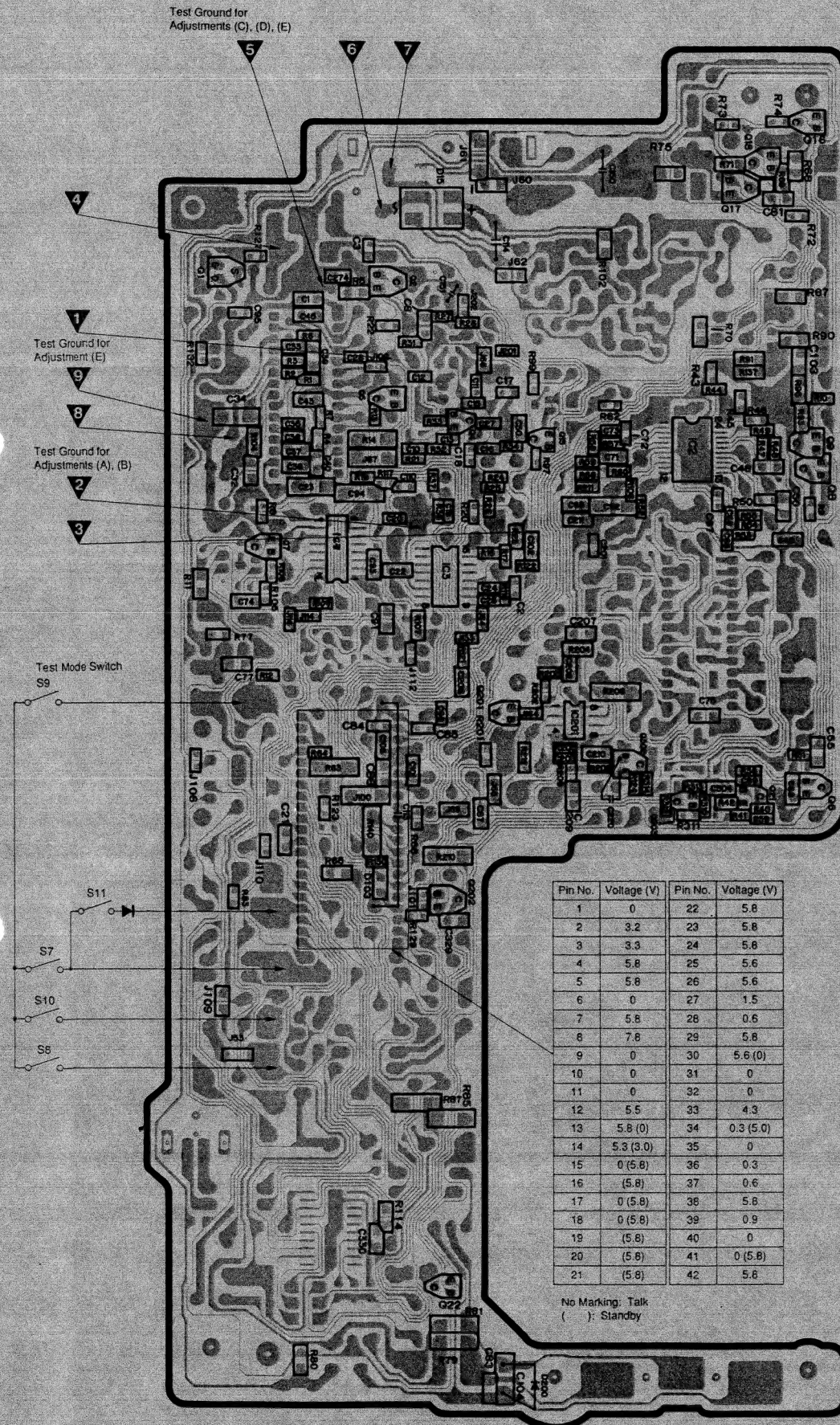
(Component View: Including Flow Solder Side Parts)





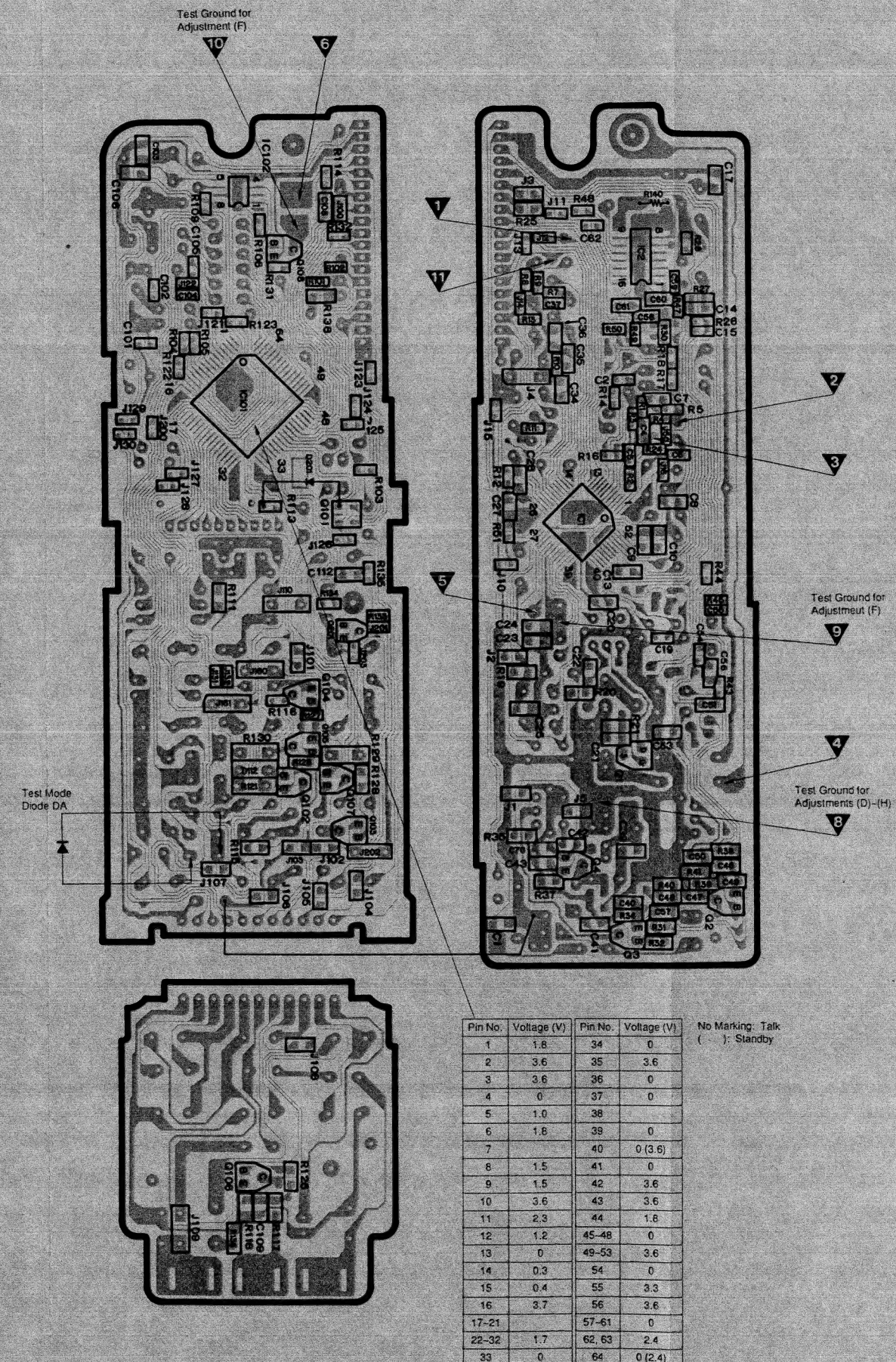
# CIRCUIT BOARD (KX-T3950H)

(Flow Solder Side View)



# CIRCUIT BOARD (KX-T3950R)

(Flow Solder Side View)





## ADJUSTMENTS (KX-T3950R)

If your unit have below symptom, adjust for each item following table of adjustment.

Symptom	Remedy
The movement of Battery Low Indicator is wrong.	Adjust the adjustment item (A)
The base unit does not receive a call from portable handset.	Adjust the adjustment item (B)
The base unit does not transmit, and the transmit frequency is slipped.	Adjust the adjustment item (C)
The transmit frequency is slipped.	Adjust the adjustment item (D)
The transmit output is low, and the arrival distance is shorted between base unit and portable handset.	Adjust the adjustment item (E)
The reception sensitivity of base unit is wrong, the noise is occurred.	Adjust the adjustment item (F)
Does not link between base unit and portable handset.	Adjust the adjustment items (G), (H)

### Unit Condition:

1. Remove the antenna lead wire from P.C. Board of portable handset.
2. Power Supply: DC 3.9 V
3. Power/Ringer switch: ON
4. Volume Selector: HIGH
5. Speaker Load: 130Ω

### How to set the test mode.

#### CH10 Test Mode

1. After connecting the diode DA, and apply a power supply DC 3.9 V.  
(The unit becomes CH10 standby.)

2. Press the talk switch.  
(The unit becomes CH10 Talk.)

3. After adjusting, remove the test mode diode DA.

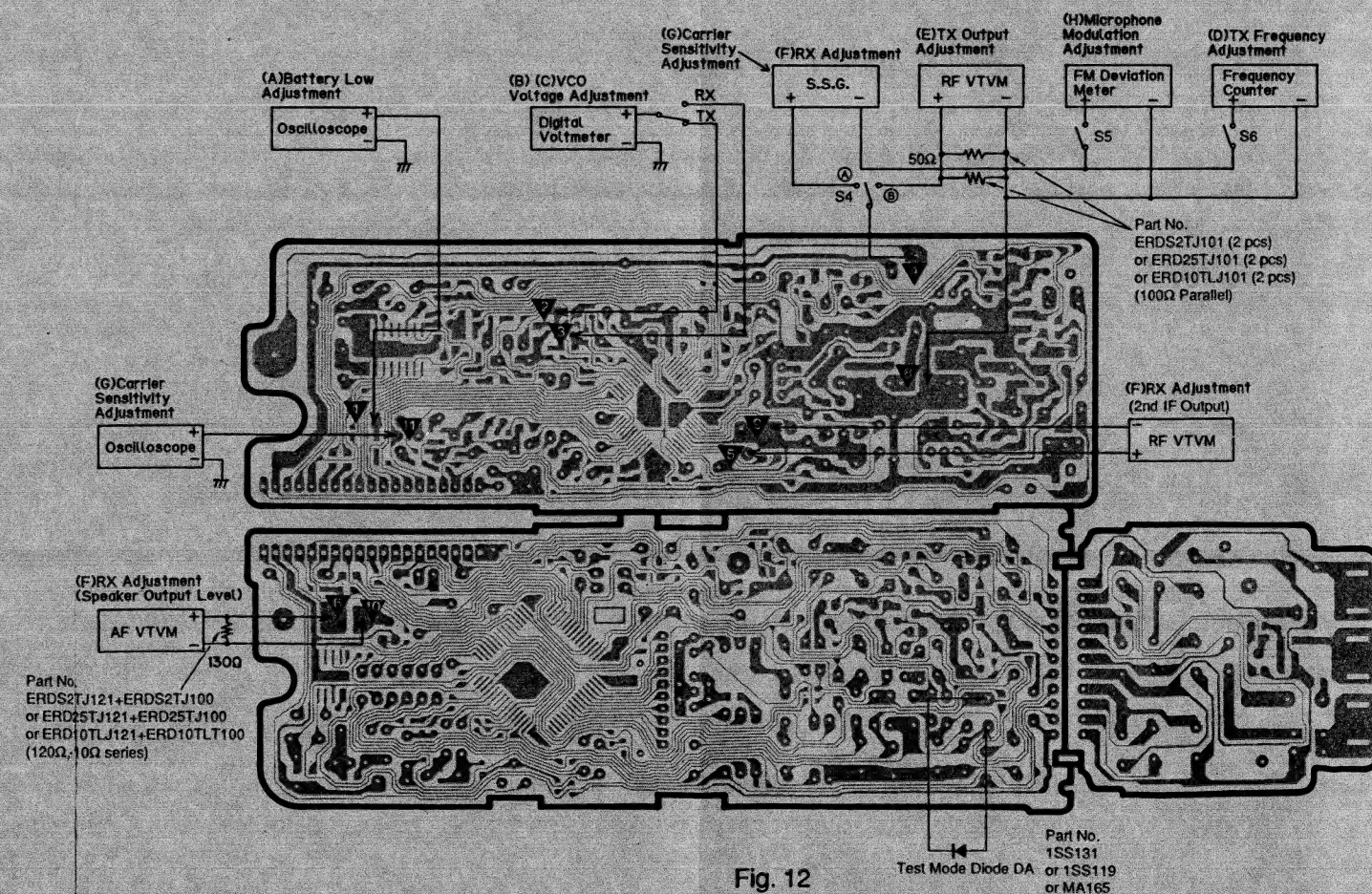
When replacing these parts, adjust as shown below table.

Replace Parts	Adjustment Items	Test Mode	Adjustment Points	Procedure
VR3	(A) Battery Low Adjustment	CH10 Talk	VR3	1. Connect the oscilloscope to $\nabla$ -Ground. 2. Set the power supply voltage to DC 3.59 V, and adjust VR3 so that the reading of oscilloscope is 1 V $\pm$ 0.3 V.
IC1, TC1, X1, T4	(B) TX VCO Voltage Adjustment	CH10 Talk	T4	1. Connect the digital voltmeter to $\nabla$ -Ground. 2. Adjust T4 so that the reading of digital voltmeter is 2.0 V $\pm$ 0.1 V.
IC1, TC1, X1, T3	(C) RX VCO Voltage Adjustment	CH10 Talk	T3	1. Connect the digital voltmeter to $\nabla$ -Ground. 2. Adjust T3 so that the reading of digital voltmeter is 2.1 V $\pm$ 0.1 V.
TC1, X1, IC1	(D) TX Frequency Adjustment	CH10 Talk S4: $\textcircled{B}$ side S5: OFF S6: ON	TC1	1. Connect the frequency counter to $\nabla$ - $\nabla$ . 2. Adjust TC1 so that the reading of frequency counter is 49.970 MHz $\pm$ 200 Hz.
T5	(E) TX output Adjustment	CH10 Talk S4: $\textcircled{B}$ side S5: OFF S6: OFF	T5	1. Connect the RF VTVM to $\nabla$ - $\nabla$ . 2. Adjust T5 for 250 mV-500 mV output on RF VTVM.

When replacing these parts, adjust as shown below table.

Replace Parts	Adjustment Items	Test Mode	Adjustment Point	Procedure
T1, T2	(F) RX Adjustment  (Speaker Output)  (2nd IF Output)	CH10 Talk S4: $\textcircled{A}$ side S5: OFF S6: OFF	T2  T1	1. Connect the S.S.G. to $\nabla$ - $\nabla$ . 2. Connect the RF VTVM to $\nabla$ - $\nabla$ . Connect the AF VTVM to $\nabla$ - $\nabla$ . 3. Apply a 60 dB $\mu$ V output from S.S.G. (modulation frequency 1 kHz, dev. 3 kHz) 4. Adjust T2 so that the reading of AF VTVM is maximum output. 5. Apply a 60 dB $\mu$ V output from S.S.G. (modulation frequency 1 kHz, dev. 3 kHz) 6. Adjust T1 so that the reading of RF VTVM is maximum output.
VR2	(G) Carrier Sensitivity Adjustment	CH5 Stand-By	VR2	1. Connect the oscilloscope to $\nabla$ -Ground. 2. Connect the S.S.G. to $\nabla$ - $\nabla$ . 3. Apply a 10 dB $\mu$ V output from S.S.G. and adjust VR2 when oscilloscope becomes from high to low.
Refer to page 55.	(H) Data Modulation of Confirmation	CH10 Talk	—	1. Connect the FM deviation meter $\nabla$ - $\nabla$ . 2. Keep pressing the flash button. 3. Confirm for a 5.5-8.0 kHz FM Deviation Meter reading.

Flow Solder Side View





← RX Signal  
← TX Signal

Fig. 39



KX-T3950      KX-T3950

## BLOCK DIAGRAM (KX-T3950R)

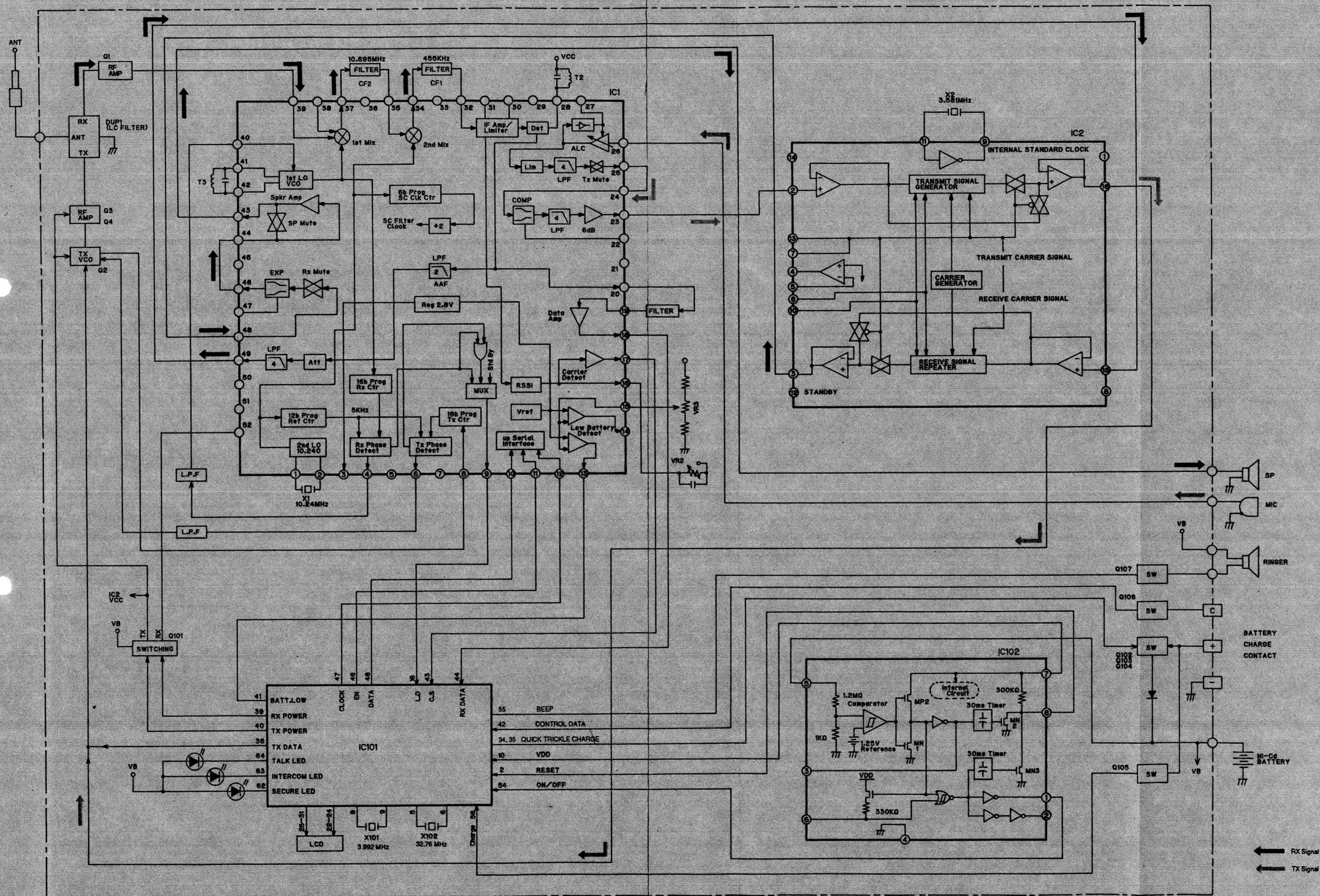


Fig. 40